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1974

SIXTY—SEVENTH REPORT OF THE STATE GEOLOGIST

ACTIVITIES OF THE CALIFORNIA DIVISION OF MINES AND GEOLOGY JULY 1, 1973, THROUGH JUNE 30, 1974

James E. Slosson, State Geologist
California Division of Mines and Geology
The Resources Building, Sacramento

STATE OF CALIFORNIA
DEPARTMENT OF CONSERVATION

THE RESOURCES AGENCY
DIVISION OF MINES AND GEOLOGY

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CALIFORNIA—THE RESOURCES AGENCY RONALD REAGAN, Governor

NT OF CONSERVATION
ON OF MINES AND GEOLOGY
I HEADQUARTERS
5 BUILDING, ROOM 1341
H STREET
ITO, CA 95814

es: LOS ANGELES
Junipero Serro Bldg., Rm. 1065
107 South Broadwoy
90012

SACRAMENTO
Resources Bldg., Rm. 118
1416 Ninth Street
95814

SAN FRANCISCO
Ferry Building
94111

31 JULY 1974

Honorable Ray B. Hunter
Director, Department of Conservation
Sacramento, California

Dear Director Hunter:

The 67th Report of the State Geologist is submitted herewith. This statutory report summarizes the accomplishments of the California Division of Mines and Geology for the fiscal year 1973-74.

The Division continued its productive efforts in the recognition, recordation, and development of mitigating measures related to geologic hazards. Bulletin 198, entitled "Urban Geology Master Plan for California", which deals with this subject, was released in 1973. It has become apparent that, except for a few cities and counties, awareness of, and capability to mitigate geologic hazards is lacking. Continued inabilities on the part of local government can easily cost the home owner and taxpayer billions of dollars during the next 25 years. The State Geologist strongly recommends that cost-saving mitigating procedures be initiated with haste.

The cooperative projects of local governments and the Division have been maintained to maximum capabilities. These projects have been affective in assisting local governments in recognizing the geologic/seismic hazards and mineral resources within their jurisdictions. The Alquist-Priolo Act has been in effect for a year and "Special Studies Zones" for the San Andreas, Hayward, Calaveras, and San Jacinto faults have been delineated, and the respective maps have been transmitted to the involved local governments; additional faults on a priority basis will be similarly delineated in 1974-75.

Cooperative work assignments with the Office of Architecture and Construction for the Hospital Safety Act (SB 519, 1972) began in May, 1973; during 1973-74, due to the efforts of the Division of Mines and Geology, the quality of site analysis prepared by consultants for hospital construction dramatically improved in quality. This is an example of what can be accomplished if enforcement is efficient and equitable.

The Strong-Motion Instrumentation Program which went into effect in 1972 has been fully implemented and a well-trained staff is efficiently pursuing the task of selecting logical sites for the instruments. It is anticipated that when future earthquakes occur, data obtained from these instruments will provide invaluable information in the pursuit of earthquake technology.

Grants from, and cooperative projects with, the United States Geological Survey have enabled additional studies of earthquake and other geologic hazards. The prime efforts of these studies have been associated with the San Andreas, San Jacinto, and Elsinore faults in California.

A planning study of the mineral resources of California was initiated early in fiscal year 1973-74. This study develops recommendations for the prevention of, and methods for the mitigation of, mineral resources shortages in California (other than natural gas, oil, and geothermal). Soon after the start of that study, SB 889 was passed which requires that the Division of Mines and Geology produce evaluations of the mineral production, potential resources, and mineral needs of California.

Respectfully,

James E. Slosson

James E. Slosson
State Geologist

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MISSION AND OBJECTIVES

The objective of the Division is to identify and to assist in meeting the geologic and mineral resources needs of California, in order to provide for the safety, economy, and enjoyment of the people of the State in relation to their geologic environment.

In operational terms, the Division's mission is to collect, develop, interpret, and disseminate geologic information, and to encourage the understanding and application of geologic knowledge in appropriate human enterprises in California.

The Division pursues these objectives on a priority basis, in cooperation with other public agencies and the private sector. Division staff is available to provide information and advice on the wise use and management of the Earth's crust, including its terrain, its geologic hazards, and its mineral resources.

In providing these services, it is the further objective of the Division to establish and maintain the highest standard of excellence among State geological surveys.

STATUTORY AUTHORITY

The Division operates under the authorities set forth in Chapter 2 of Division 1 and Chapters 1 and 2 of Division 2 of the Public Resources Code. The significant sections are summarized here:

Sections	Substance of Law
601, 607	Establishes Department of Conservation in The Resources Agency and Division of Mines and Geology and three other Divisions in Department of Conservation.
660-667	Establishes State Mining and Geology Board and its responsibilities
680	Establishes State Geologist as Chief of Division.
2201	State Geologist shall employ geologists and qualified specialists to do Division's work.
2203	State Geologist shall submit an annual report, including review of measures taken to counter geologic hazards, and review of economic utilization and conservation of State's mineral resources
2204	State Geologist may receive and manage gifts on behalf of State.
2205	State Geologist may: Study mineral resources, mineral industries, and geology of the state; Collect mineral statistics; Collect geological and mineralogical specimens and models to constitute Division's exhibits; Provide technical library to be Division's library; Maintain, in effect, a bureau of information on the State's

mineral industries; Conduct studies of geologic hazards in urban areas, including activities under cooperative agreements; Maintain a laboratory to perform physical and chemical tests and analyses; Issue reports and maps on the geology of the State and the statistic and technology of the State's mineral industries.

2207 State Geologist shall compile and publish statistical bulletins to show totals of minerals produced, annually.

2622 State Geologist shall delineate Special Studies Zones to encompass potentially and recently active faults (Alquist-Priolo Act).

2650 State Geologist shall carry out State Mining and Minerals Policy.

2700 State Geologist shall conduct the Strong-Motion Instrumentation Program throughout the State.

RECENT LEGISLATION

A variety of bills dealing with subjects of concern to the Division were introduced in the Legislature during 1973-74. The bills enacted into law during this period are:

SB 893, Berryhill:	Calls for an annual report of geologic hazard abatement and mineral resource conservation;
SB 1114, Gregorio:	Calls for school buildings situated on an active fault to be relocated;
SB 1903, Alquist:	Revises definition of "hospital building" regarding seismic structural safety;
SCR 77, Alquist:	Calls for development of seismic safety plan and final report of Committee on Seismic Safety;
AB 12, Ray E. Johnson:	Reduces minimum franchise tax on inactive gold and quicksilver corporations;
AB 844, Ray E. Johnson:	Revises procedures by which tax collector shall sell tax-deeded oil, gas, and mineral rights or certain miscellaneous parcels;
AB 1288, Keene:	Authorizes funding for replacement of Sonoma County school buildings damaged in 1969 earthquake and subsequently demolished;
AB 1422, Chappie:	Revises Geologist and Geophysicist Act to provide that a violator of the Act is guilty of a misdemeanor; makes other changes;
AJR 32, Brown:	Supports continuous assistance to the Nicaraguan earthquake victims.

In addition several bills dealing with the retention of mineral rights and the disposal of surplus state land were also passed.

STATE MINING AND GEOLOGY BOARD

This Board, which is within the Department of Conservation, consists of 11 members, nine of whom are "associated with or having broad knowledge of the mineral industries of this State, of its geologic resources, or of related technical and scientific fields..." and two of whom are members of the public, having an interest in, and knowledge of, the environment.

The Public Resources Code states that: "The Board shall represent the State's interest in the development, utilization, and conservation of the mineral resources of the State and in the development, collection, collation, and dissemination of geological information necessary to the understanding and utilization of the State's terrain and information pertaining to earthquake and other geologic hazards. It may establish policies conforming to the provisions of State statutes to govern the administration of the Division of Mines and Geology." The Board reviews Division policies and programs from time to time at its meetings. The Board also serves as a policy and appeals board for the purposes of the active fault Special Studies Zones, or Alquist-Priolo, Act (Chapter 7.5, Division 2, Public Resources Code).

The State Geologist, who serves as Chief of the Division, is "appointed under provisions of the State Civil Service Act by the Director [of the Department of Conservation] upon nomination by the Board".

During 1973-74, the Board met August 23, in Sacramento; October 25, in Los Angeles; November 21, at San Francisco Airport; January 24, in Sacramento; March 14, in Sacramento; and May 30, in San Francisco.

Board Actions, fiscal year 1973-74

- Developed Policies and Criteria for Special Studies Zones, under the Alquist-Priolo Act, to guide local government building permit decisions.

- Continued refinement of draft of State Mining Reclamation Plan, in 8th draft.

- Adopted motion requesting cooperation between The Resources Agency and the U.S. Bureau of Land Management in the Bureau's Desert Area Management program.

- Adopted motion requesting clarification of U.S. Forest Service rules requiring $2,000 bond from prospectors, to assure restoration of disturbed areas.

- Adopted motion seeking funding for publication of Alquist-Priolo Special Studies Zones maps in folio format.

- Re-elected for second one-year terms: Richard H. Jahns, Chairman; Clarence Allen, Vice Chairman; J. Wilmar Jensen, Secretary.

- Participated in two public hearings presenting and explaining the operation of the Alquist-Priolo Act.

- Reviewed public agency comment on draft Special Studies Zones maps, and approved their official form for distribution 1 July 1974.

- Appointed subcommittee to investigate possible public release of geologic data in oil company files.

- Sent letter to Director of Conservation, Ray B. Hunter, expressing opposition to proposed withdrawal of Death Valley lands from mineral entry by National Park Service without first determining the mineral potential.

STATE MINING AND GEOLOGY BOARD

BOARD MEMBERS	CURRENT TERM	FIRST APPOINTED
CLARENCE R. ALLEN California Institute of Technology P.O. Bin 2 Arroyo Annex, Pasadena 91109	1973-77	1969
PHILIP R. BRADLEY 2801 Oak Knoll Terrace, Berkeley 94705	1972-76	1944
EDMOND F. BROVELLI Basalt Rock Co. P.O. Box 2540, Napa 94558	1971-75	1962
L. LEROY CRANDALL LeRoy Crandall & Associates 711 N. Alvarado Street, Los Angeles 90026	1973-76	1973
JOSEPH E. HARING Department of Economics Occidental College, Los Angeles 90041	1971-75	1971
PAUL C. HENSHAW Homestake Mining Company 650 California Street, San Francisco 94108	1972-76	1968
RICHARD H. JAHNS School of Earth Sciences Stanford University, Stanford 94305	1974-78	1966
J. WILMAR JENSEN Jensen & Gaarde P.O. Box 1726, Modesto 95354	1974-78	1971
EUGENE F. REID P.O. Box 2471, Bakersfield 93303	1971-75	1971
KARL V. STEINBRUGGE Insurance Services Office 465 California Street, San Francisco 94104	1973-77	1969
DONALD A. WOOLFE San Mateo County Planning Department County Government Center, Redwood City 94063	1973-77	1973

ADMINISTRATION AND ORGANIZATION

Mr. Wesley G. Bruer resigned as Chief of the Division effective 31 October 1973, and Dr. James E. Slosson, the former Chief Deputy State Geologist, was appointed Chief and State Geologist. Following the change in administrative leadership, a change was made in the Division's organizational plan.

The functions of the former Executive Officer were given to Mr. Thomas E. Gay, Jr., the newly appointed Chief Deputy State Geologist. The Chief Deputy is now responsible for most operations of the Division. The District Geologists, working under direction from the Chief Deputy, are responsible for the generation of programs, projects, and cooperative contracts, the timely completion of project work, and the critical review of all manuscripts generated in their districts. Dr. John T. Alfors, Mr. Cliffton H. Gray, Jr., and Mr. Richard M. Stewart respectively, are District Geologists of Sacramento, Los Angeles, and San Francisco.

Under the new organizational scheme, certain activities are placed under the direction of Special Assistants who report directly to the State Geologist. Thus the Mineral Resources Coordinator, Mr. James R. Evans, has been given the responsibility to prepare the mineral plan, direct mineral resources activities, establish program and projects, and approve reports for a group who are ostensibly being directed by other administrative officials. In similar manner, the Environmental and Engineering Geology Report Reviewer, Mr. Perry Y. Amimoto has been given the responsibility to review for adequacy of geologic and seismic data the EIRs, EISs, hospital site reports, and seismic safety elements that are submitted to the Division for review. Some reports are returned to the writer to obtain supplemental information.

The Deputy for Administration and Planning serves nominally as the administrative head of the staff section which is now composed of three units. Planning is not the function of this group as noted above; the Advance Planning Officer is being utilized to review proposed Federal and State legislation to assess its impact upon the Division, and to recommend official positions thereon. The Geologic Data Officer's responsibilities are now limited to the processing of manuscripts for publication, but his group is still primarily responsible for publishing California Geology and special items such as this Annual Report. Most of the technical and grammatical editing is now being done at the district level. The Program and Support Officer provides administrative assistance to the Division, directs the Publication Supervisor and his staff, logs the progress of Project activities, and directs the secretarial section of the headquarters office. At year's end the Program and Support Officer was placed in charge of the Strong-Motion Instrumentation Program which had been established under the Sacramento District Geologist's direction.

N. B. Livermore Jr.

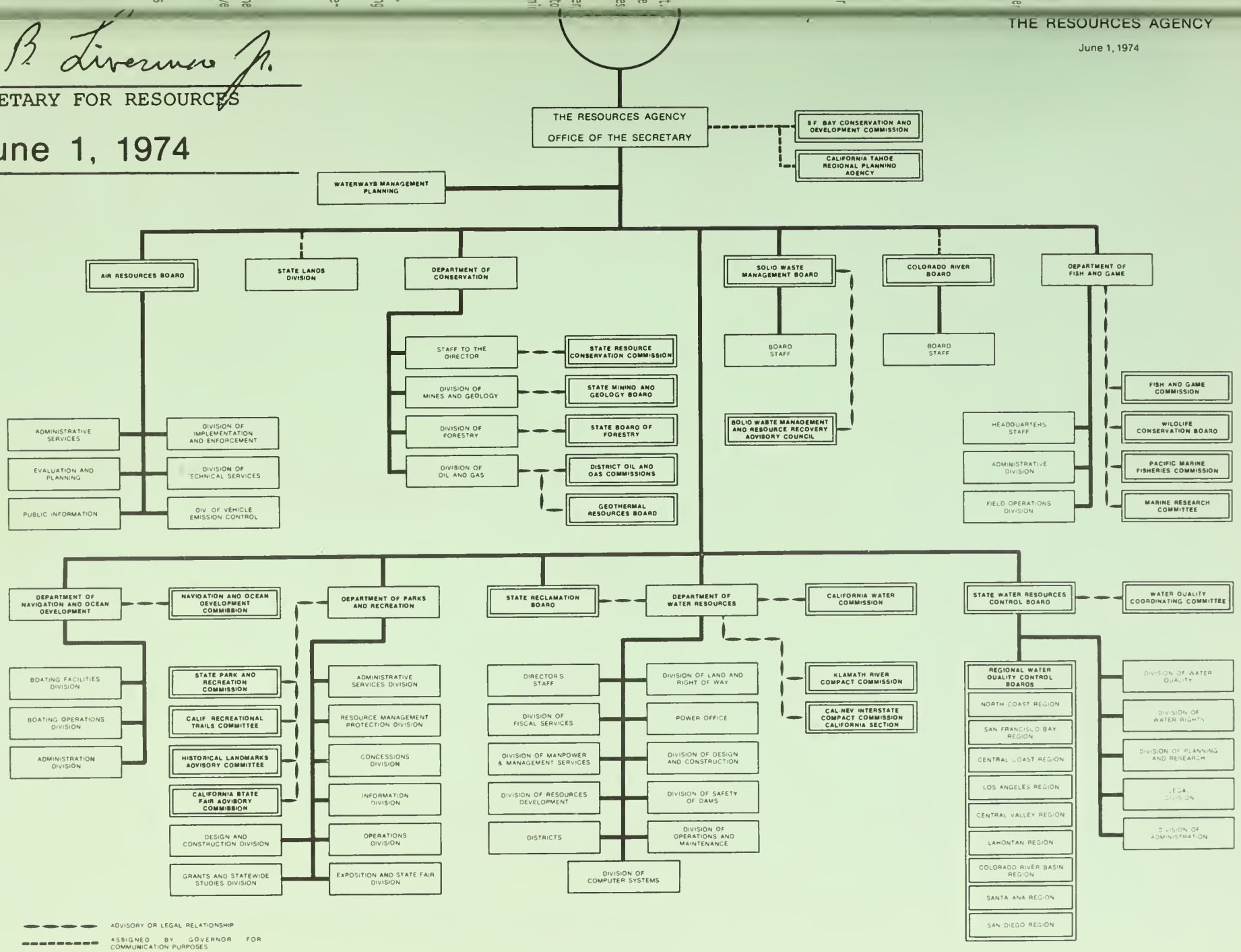
SECRETARY FOR RESOURCES

June 1, 1974

DATE

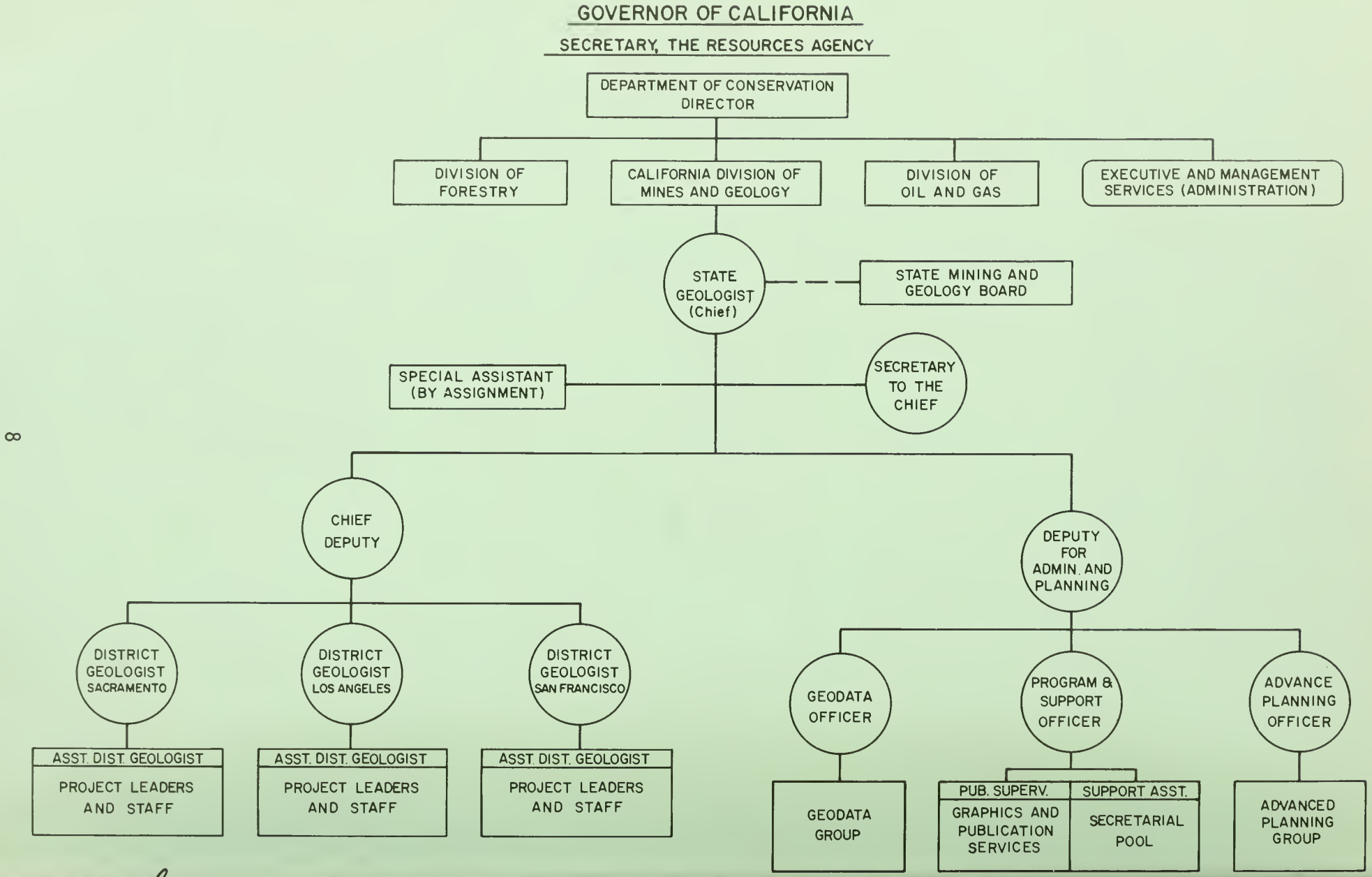
THE RESOURCES AGENCY

June 1, 1974



ORGANIZATION
CALIFORNIA DIVISION OF MINES AND GEOLOGY

MARCH 1, 1974



APPROVED:

PERSONNEL

James E. Slosson is the State Geologist and Chief of the Division of Mines and Geology. He is assisted by his executive staff - the Chief Deputy State Geologist, the Deputy for Administration and Planning, the Geologic Data Officer, the Program and Support Officer, and the Advance Planning Officer. In addition, permanent Division staff is comprised of 46 geologists, 2 geochemists, 3 geophysicists, 3 seismologists, and 41 supporting technical, editorial, and clerical personnel.

HIRED

Senior Engineering Geologist	Perry Y. Amimoto
Petroleum Geologist	Edward C. Sprotte
Associate Seismologist	Roger W. Sherburne, Tousson R. Toppozada
Assistant Geologist	Charles R. Real, Mary C. Woods
Junior Geologist	David J. Beeby, Robert L. Hill, Jay H. Power, David L. Wagner
Electronics Technician	Harry P. La Gesse
Library Technical Assistant	Judith A. Toole
Stenographer	Laura B. Carter, Suzanne L. Cross, Maria R. Guanco
Clerk-Typist II	Dorothy L. Hamilton, Mary B. Hardesty Sue E. Torres
Clerk-Typist I	Vicki L. Forrester

SEPARATED

State Geologist	Wesley G. Bruer
Supervising Geologist	James B. Koenig
Senior Marine Geologist	Edward E. Welday (transfer to State Lands Division)
Assistant Geologist	Richard D. Knox
Junior Geologist	William L. Harris (deceased), Roald Bendixen (transfer to Caltrans)
Laboratory Technician	Earle W. Deneau (changed to temporary part-time)
Library Technical Assistant	Marsha J. Nishikawa
Senior Stenographer	Josephine M. Territo (6 month leave)
Senior Clerk	Allen W. Lasley (retired)
Stenographer	Sharon M. Burton, Laura B. Carter, Jean E. Holmes, Jacqueline R. Jann
Clerk-Typist II	Mary B. Hardesty (transfer to Division of Oil and Gas), Patricia D. Petersen

PROMOTED

State Geologist	James E. Slosson
Chief Deputy State Geologist	Thomas E. Gay, Jr.
Supervising Geologist	John T. Alfors, Cliffton H. Gray, Jr., Richard M. Stewart
Senior Geologist	Roger W. Greensfelder, Robert Streitz
Associate Geologist	Carl J. Hauge
Assistant Geologist	Trinda L. Bedrossian, Richard D. Knox, John S. Rapp, Yvor H. Smitter
Junior Geologist	Roald L. Bendixen
Geological Drafting Technician	Richard T. Boylan, Dorothy Y. Fong, Elizabeth M. Lindgren, Vivian M. Muston Robert R. Switzer
Senior Librarian	Mary R. Weinstein
Senior Clerk-Typist	Margaret W. Turner

REASSIGNED

Rudolph G. Strand, Senior Geologist, was assigned to serve as Acting Deputy for Administration and Planning.

Robert Streitz, Senior Geologist, was assigned to serve as Advance Planning Officer

John T. Alfors, Supervising Geologist, was assigned to serve as District Geologist, Sacramento District.

Carl J. Hauge, Associate Geologist, was assigned to serve as Geologic Data Officer.

Tom M. Wootton, Associate Geologist, was assigned to serve as Program and Support Officer.

TRANSFERRED

Headquarters	Thomas E. Gay, Jr., Chief Deputy State Geologist; Robert Streitz, Senior Geologist
Sacramento District Office	John T. Alfors, Supervising Geologist

PERMANENT DIVISION STAFF MEMBERS ON 30 JUNE 1974

MPLOYEE	CLASSIFICATION	LOCATION
ames E. Slosson	State Geologist	Headquarters
homas E. Gay, Jr.	Chief Deputy State Geologist	Headquarters
udolph G. Strand	Senior Geologist, Acting Deputy	Headquarters
arl J. Hauge	Associate Geologist, Geologic Data Officer	Headquarters
om M. Wootton	Associate Geologist, Program and Support Officer	Headquarters
obert Streitz	Senior Geologist, Advance Planning Officer	Headquarters
ohn T. Alfors	Supervising Geologist, District Geologist	Sacramento
liffton H. Gray, Jr.	Supervising Geologist, District Geologist	Los Angeles
ichard M. Stewart	Supervising Geologist, District Geologist	San Francisco
odger H. Chapman	Senior Geologist	Sacramento
harles W. Chesterman	Senior Geologist	San Francisco
eorge B. Cleveland	Senior Geologist	San Luis Obispo
ames R. Evans	Senior Geologist	Headquarters
oger W. Greensfelder	Senior Geologist	Sacramento
ary R. Hill	Senior Geologist	Headquarters
harles W. Jennings	Senior Geologist	San Francisco
erry Y. Amimoto	Senior Engineering Geologist	Headquarters
dward C. Sprotte	Petroleum Geologist	Los Angeles
. Forrest Bacon	Associate Geologist	Sacramento
llan G. Barrows	Associate Geologist	Los Angeles
harles C. Bishop	Associate Geologist	San Francisco
ohn L. Burnett	Associate Geologist	Sacramento
illiam B. Clark	Associate Geologist	Sacramento
arl W. Hart	Associate Geologist	San Francisco
ichael E. Huffman	Associate Geologist	San Francisco
ames E. Kahle	Associate Geologist	Los Angeles
rederic R. Kelley	Associate Geologist	San Francisco
ichael P. Kennedy	Associate Geologist	San Diego
aul K. Morton	Associate Geologist	Santa Ana
alem J. Rice	Associate Geologist	San Francisco
homas H. Rogers	Associate Geologist	San Jose
Richard B. Saul	Associate Geologist	Los Angeles
elvin C. Stinson	Associate Geologist	San Francisco
F. Harold Weber, Jr.	Associate Geologist	Los Angeles
Glenn A. Borchardt	Associate Geochemist	San Francisco
Hasmukhrai H. Majmundar	Associate Geochemist	San Francisco
John H. Bennett	Associate Geophysicist	Sacramento
Gordon W. Chase	Associate Geophysicist	Sacramento
William M. Wells	Associate Geophysicist	Sacramento

Donald A. Rodgers	Associate Seismologist	Sacramento
Roger W. Sherburne	Associate Seismologist	Sacramento
Tousson R. Toppozada	Associate Seismologist	Sacramento
Charles F. Armstrong	Assistant Geologist	San Francisco
Quintin A. Aune	Assistant Geologist	Sacramento
Trinda L. Bedrossian	Assistant Geologist	Headquarters
Donald L. Fife	Assistant Geologist	Los Angeles
Edmund W. Kiessling	Assistant Geologist	Los Angeles
John S. Rapp	Assistant Geologist	Sacramento
Charles R. Real	Assistant Geologist	San Bernardin
Yvor H. Smitter	Assistant Geologist	Headquarters
John W. Williams	Assistant Geologist	San Francisco
Mary C. Woods	Assistant Geologist	Headquarters
David J. Beeby	Junior Geologist	Los Angeles
Robert L. Hill	Junior Geologist	Los Angeles
Russell V. Miller	Junior Geologist	Santa Ana
Jay H. Power	Junior Geologist	Sacramento
Drew P. Smith	Junior Geologist	Los Angeles
Theodore C. Smith	Junior Geologist	San Francisco
Siang S. Tan	Junior Geologist	Los Angeles
David L. Wagner	Junior Geologist	San Francisco
Leslie Morrow	Civil Engineering Technician II	Sacramento
Harry P. La Gesse	Electronics Technician	Sacramento
Lydia Lofgren	Laboratory Technician	San Francisco
Charles B. Smith	Laboratory Technician	San Francisco
Ernest C. Durrwachter	Geologic Aid	Sacramento
William F. Genthe	Geologic Aid	San Francisco
Peter Helander	Geologic Aid	Los Angeles
Duane A. McClure	Geologic Aid	San Francisco
Gary C. Taylor	Geologic Aid	Sacramento
R. Merl Smith	Publications Supervisor	Headquarters
Richard R. Moar	Senior Geological Drafting Technician	San Francisco
Richard T. Boylan	Geological Drafting Technician	Headquarters
Dorothy Y. Fong	Geological Drafting Technician	Headquarters
Edward L. Foster	Geological Drafting Technician	Headquarters
Elizabeth M. Lindgren	Geological Drafting Technician	Los Angeles
Vivian W. Muston	Geological Drafting Technician	Headquarters
Robert R. Switzer	Geological Drafting Technician	San Francisco
Jeffrey O. Tambert	Geological Drafting Technician	Headquarters
Donald R. Anderson	Delineator	San Francisco
Ronald L. Morgan	Graphic Artist	Headquarters
Mary R. Weinstein	Senior Librarian	San Francisco
Judith A. Toole	Library Technical Assistant I	San Francisco
Mary L. Burgess	Secretary I	Headquarters
Dorris P. Campbell	Senior Stenographer	Sacramento
Josephine M. Territo	Senior Stenographer	On Leave
Eleanor M. Learned	Senior Information Clerk	San Francisco
Wilma L. Ashby	Senior Clerk-Typist	Los Angeles
Gloria Tomei	Senior Clerk-Typist	Sacramento
Margaret W. Turner	Senior Clerk-Typist	Headquarters

Beryl Adrian	Stenographer	Sacramento
Suzanne L. Cross	Stenographer	Headquarters
Marilyn F. Dayton	Stenographer	San Francisco
Maria R. Guanco	Stenographer	Headquarters
Dorothy L. Hamilton	Clerk-Typist II	San Francisco
Venice Huffman	Clerk-Typist II	Los Angeles
Marianne K. Roja	Clerk-Typist II	San Francisco
Sue E. Torres	Clerk-Typist II	Los Angeles
Joanne M. Traer	Clerk-Typist II	Headquarters
Betty E. Van Den Berg	Clerk-Typist II	San Francisco
Vicki L. Forrester	Clerk-Typist I	Headquarters
Andrew C. Love	Janitor	San Francisco

TEMPORARY EMPLOYEES

The Division has participated in the various Federally, State, and locally funded student aid and educational programs throughout the year. At one time or another, the Division has utilized the services of two College Work-Study students, 13 Neighborhood Youth Corps participants, and two High School Work Experience students.

Nine Student Assistants and four Seasonal Clerks were employed in full- or part-time positions during the year. In addition, two Division retirees were employed on an intermittent basis in the class of Senior Geologist.

DISTRICTS

LOS ANGELES

The Los Angeles District office, which is situated in the Junipero Serra Building at First and Broadway, provides service to 11 counties in the southern third of California. This includes the densely populated areas of Los Angeles and San Diego, as well as the sparsely populated desert region of southeastern California.

This District office is a center of geologic field investigations. It maintains a library with special emphasis on geologic hazards and mineral resources of the districts, and a small mineral exhibit.

Most of the geologic effort has been undertaken on a cooperative basis with the counties in the more densely populated part of the district and with the U.S. Geological Survey. The main emphasis is on geologic hazards and environmental protection, with a smaller effort being devoted to mineral resource activities.

The District staff comprises 17 geologists, 1 geologic aid, 1 geological drafting technician, and 3 secretaries. Some staff members work from field offices established at Santa Ana, UCLA, San Luis Obispo, and San Diego.

SACRAMENTO

The Sacramento District comprises 30 counties in central inland and northeastern California. The Sacramento District office, located in the Resources Building at Ninth and O Streets in Sacramento, provides Division services to the people of those 30 counties, and also houses the Division's Geophysical, Seismological, and Strong-Motion Instrumentation sections, which provide those special services to the entire state.

District efforts have focused upon crustal deformation and seismicity with a view toward developing an earthquake-warning system by identifying precursors of earthquakes. Geological work has emphasized mineral resources and the evaluation of environmental considerations in land development.

The District staff comprises 7 geologists, 3 geophysicists, 3 seismologists 2 geologic aids, 1 civil engineering technician, 1 electronics technician, 2 secretaries, and 1 information clerk.

SAN FRANCISCO

The San Francisco District office, which has been housed in the historical landmark, the Ferry Building, since 1896, covers a working territory of 17 counties in northern and central coastal California. This includes approximately two-thirds of the California seacoast, most of the central and northern Coast Ranges, and much of the very active San Andreas and related faults.

This District office has several facets--Geochemical Laboratory; Marine Geology Section; Map Room, which compiles and prepares various maps such as the Geologic Map of California series; a large and complete technical reference library; and one of the largest mineral exhibits on the west coast.

Many cooperative projects with various San Francisco bay area counties and the U.S. Geological Survey have been undertaken by this office. The main emphasis is on geologic hazards and seismic safety, with a lesser effort in mineral resources activities.

The District staff comprises 15 geologists, 2 geochemists, 3 laboratory technicians, 2 geologic aids, 3 draftsmen, 2 librarians, 4 secretaries and clerks, 2 information clerks, and 1 janitor. There are two field offices, one in San Jose and one in Santa Rosa.

PROGRAMS OF THE DIVISION

ENVIRONMENTAL AND ECONOMIC GEOLOGY ELEMENT

Geologic Hazards

In the interest of public safety and in accordance with SB 889, 1973, the Division has been concentrating effort in areas that are being considered for urban development and where the geologic environment can affect both public safety and design concepts. It is hoped that these data will be effectively utilized by local governments, both local and state public agencies, and the private sector. Recent experience with the Department of Real Estate has shown that, except for a few cities and counties such as the cities of Los Angeles, Glendale, and Thousand Oaks and the counties of Los Angeles, Orange, and Ventura, local government is not adequately utilizing and/or enforcing Chapter 70 of the Uniform Building Code, and geologic hazards abatement requirements are below the state of the art in most areas of California. Technology exists (CDMG Bulletin 198) to recognize and mitigate these hazards with cost-benefits in favor of utilizing Chapter 70 and adequate goelogic analysis averaging an 8:1 ratio in favor. Bulletin 198 estimates potential losses from landsliding of almost 10 billion dollars within the next 25 years if mitigating measures are not taken (Chapter 70 UBC). Additional losses from geologic hazards, if corrective measures are not taken, are 21 billion dollars from earthquake shaking, 17 billion dollars from loss of mineral resources, and over 6 billion dollars from flooding. Erosion, expansive soil, fault displacement, volcanic eruption, tsunamis, and subsidence will cause a loss of 942 million dollars.

Legislation was introduced in 1973-74 to encourage the development of capabilities of the majority of local governments not now utilizing and/or enforcing Chapter 70 of the Uniform Building Code to both use and enforce it, and to require that geologic reports be prepared only by those possessing knowledge and expertise in geology.

Cooperative studies with local governmental agencies, other State agencies, and Federal agencies enabled the Division to broaden the knowledge bank and provide vital geologic data to both the public and private sectors. The most critical of these studies during 1973-74 were related to earthquake technology and these include the recognition of active faults (Alquist-Priolo Special Studies Zones maps); mapping of active faults for local government, such as the San Andreas fault in Los Angeles and San Bernardino counties; the assistance to local government in recognizing seismic risk zones, such as for San Bernardino and Orange counties; and the assistance in preparing the seismic elements for the General Plan such as for the Tri-Cities area, Santa Clara, and Sonoma counties.

Other assignments related to geologic/seismic hazards that will greatly benefit the people of California and provide increased public safety are the Strong-Motion Instrumentation Program, the procedures for the review of

Hospital Site Investigation Reports, the critical review of EIR and EIS submittals to the State of California, contributions to the Solid Waste Management Board, contributions to the basic geology of California, and other environmental and engineering geology assignments.

Basic Geology

No geologic efforts of the Division can progress far without relying upon fundamental scientific information. These "basic geology" studies are designed to determine the general geologic framework of California, the properties of crustal materials, the geologic processes responsible for the distribution and configuration of various rock units and mineral resources, and the geologic processes responsible for the seismic adjustment of various rock units.

Geochemistry

The primary mission of the Geochemical Laboratory is to provide geochemical support to other Division project activities. The workload is substantial; and, during the year, about 500 samples were processed, many of which were supplied by geologists working on various cooperative projects.

Considerable effort was directed toward the use of the atomic absorption spectrophotometer equipment. Existing procedures were improved, and new procedures were developed. Detection limits were established and made known to the staff for arsenic, cadmium, calcium, chromium, mercury, magnesium, potassium, and sodium.

Procedures for clay studies were improved. Apparatus was assembled for constant water bath condition and air jet dispersion for mechanical analysis. Also, a procedure was developed for torsion vane shear tests. Relative humidity apparatus was utilized in connection with x-ray diffraction studies on clay.

Procedures were developed for utilization of computer cards for the Geochemical Data Bank and three more programs were prepared for tabulations of sample identification parameters geochemical data, and physical testing data.

Minerals

During fiscal year 1973-74 an organizational framework was developed for the new minerals program. There are three major parts of the program: 1) mineral activities; 2) mineral commodity studies; and 3) mining laws and regulations--all under the immediate direction of the Minerals Coordinator in Sacramento. A fourth part--Mineral Economic Studies--is also planned.

Studies of mineral activities is to increase the Division's knowledge of our mineral industry--its operation, activities, production and marketing and other mineral related activities. All this is vital for proper planning of mineral commodity studies, for partial preparation of a report to meet the

requirement of newly enacted legislation, and for preparation of adequate mining activity, and mineral commodity statistical reports. Our informational services to the public, governmental agencies, and the mineral industry will increase. This part of the program is staffed with three geologists, one in each District Office. Appropriate information files on the minerals industry will be developed in all three District Offices.

Mineral commodity studies are done on statewide, regional, county, mineralized district or area, individual mine, prospect, and other bases (see chart). During fiscal year 1973-74 two mineral commodity studies were authorized and begun 1 July 1974: 1) A statewide study of nickel-cobalt involving geologic environment, mineral reserve, and mineral resource potential, mining and milling conditions and problems, and supply and demand situation for California. A $24,000 grant for fiscal year 1974-75 was awarded by the U. S. Bureau of Mines to be used for this study. The project will take 3 man years over the next 1½ years; 2) A statewide study of uranium-thorium involving the same areas of interest as given for nickel-cobalt. This project is for one man year for fiscal year 1974-75.

Federal, State and any other mining laws and regulations are of great interest to the Division. The Minerals Coordinator and others analyze and/or contribute ideas to legislation regarding the mineral industry.

A minerals classification for Division work was made. It will serve as a framework for mineral production, sales, and use data reporting, and as a guide for mineral commodity work (see table). Two new field and office report forms were developed; one for mineral properties and the other for custom mills and/or processing plants. These forms will serve as guidelines for gathering field and office data and will provide for the rapid dissemination of data throughout the Division and to any interested party. A new form to be used as a guide for recording field and office data on sand and gravel deposits was also developed. A procedure was established for analyzing, processing, and transmitting comments on U. S. Bureau of Land Management withdrawals or exchanges of public lands. All Division comments are cleared with the Department of Conservation and the Resources Agency.

All mineral production, sales and use records were transferred to the Division's headquarters office in Sacramento for central filing. Division staff will use these confidential records according to newly established procedures.

Table of minerals, energy, and value-added materials

MINERAL FUELS, ENERGY MINERALS, AND MATERIALS

Bituminuous rocks
Coal
Natural gas (& liquids)
Natural steam
Petroleum (crude)
Thorium
Uranium

METALLIC MINERALS

Ferrous Metals

Chromium
Cobalt
Columbium
Iron
Manganese
Molybdenum
Nickel
Tantalum
Tungsten
Vanadium

Nonferrous Metals

Aluminum
Antimony
Arsenic
Beryllium
Bismuth
Cadmium
Copper
Hafnium
Lead
Magnesium and magnesium compounds
Mercury
Scandium
Tellurium
Tin
Titanium
Zinc
Zirconium

Minor Metals

Cesium
Gallium
Germanium
Indium
Rhenium
Rhubidium
Selenium
Thallium

Precious Metals

Gold
Silver
Platinum group

Rare-Earth Metals

Cerrium group earths
Yittrium group earths

VALUE-ADDED MATERIALS

Carbon dioxide
Cement
Clay products
Fly and bottom ash
Lime
Montan wax
Nitrogen compounds
Slag
Steel
Sulfuric acid

NONMETALLIC MINERALS

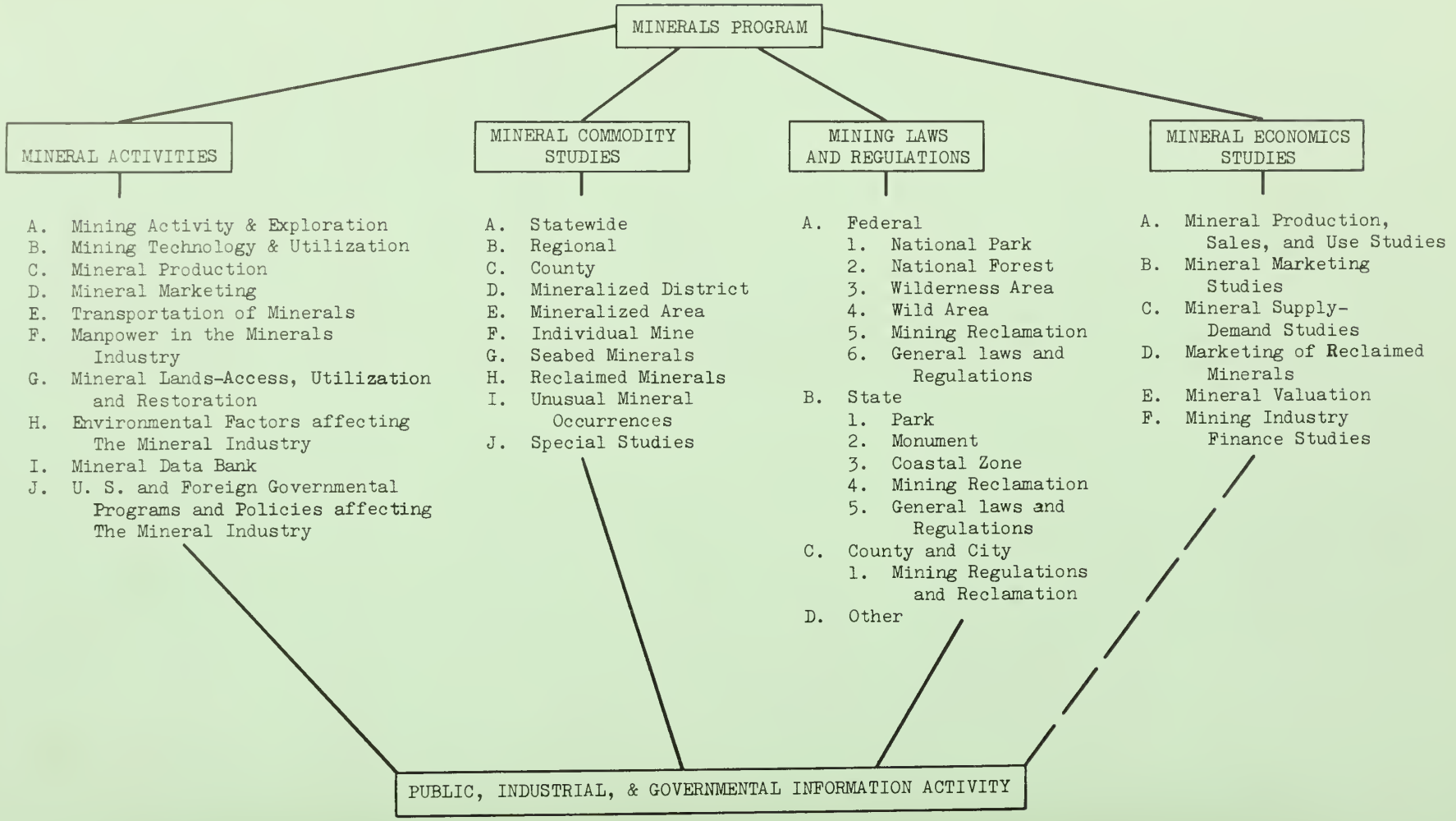
Industrial Minerals and Materials

Asbestos
Barite
Borates
Bromine
Calcite (optical grade)
Calcium chloride
Clays and bentonite
Diamonds-industrial
Diatomite
Feldspar
Flourite
Garnet
Gem stones
Graphite
Iodine
Kyanite, andalusite, and silliminite
Lithium and lithium compounds
Magnesium and magnesium compounds
Mica
Peat
Phosphate
Potassium and potassium compounds
Quartz crystal (electronic grade)
Quartzite and quartz
Salt
Sodium carbonate and sulfate, and compounds of sodium
Strontium
Sulfur
Talc, soapstone, and pyrophyllite
Wollastonite
Zeolites

Construction Minerals

Gypsum and anhydrite
Carbonate rocks
Pumice, pumicite, perlite, and volcanic cinders
Sand and gravel
Shale
Specialty sands
Stone, dimension and ornamental
Vermiculite

CALIFORNIA DIVISION OF MINES AND GEOLOGY


MINERALS PROGRAM
MINERAL ACTIVITIES
A. Mining Activity & Exploration
B. Mining Technology & Utilization
C. Mineral Production
D. Mineral Marketing
E. Transportation of Minerals
F. Manpower in the Minerals Industry
G. Mineral Lands-Access, Utilization and Restoration
H. Environmental Factors affecting The Mineral Industry
I. Mineral Data Bank
J. U. S. and Foreign Governmental Programs and Policies affecting The Mineral Industry
MINERAL COMMODITY STUDIES
A. Statewide
B. Regional
C. County
D. Mineralized District
E. Mineralized Area
F. Individual Mine
G. Seabed Minerals
H. Reclaimed Minerals
I. Unusual Mineral Occurrences
J. Special Studies
MINING LAWS AND REGULATIONS
A. Federal
1. National Park
2. National Forest
3. Wilderness Area
4. Wild Area
5. Mining Reclamation
6. General laws and Regulations
B. State
1. Park
2. Monument
3. Coastal Zone
4. Mining Reclamation
5. General laws and Regulations
C. County and City
1. Mining Regulations and Reclamation
D. Other
MINERAL ECONOMICS STUDIES
A. Mineral Production, Sales, and Use Studies
B. Mineral Marketing Studies
C. Mineral Supply-Demand Studies
D. Marketing of Reclaimed Minerals
E. Mineral Valuation
F. Mining Industry Finance Studies
PUBLIC, INDUSTRIAL, & GOVERNMENTAL INFORMATION ACTIVITY
A. Information Desks, District Offices
B. Library, District Offices
C. Published Reports
USE OF MINERAL INFORMATION BY THE PUBLIC, INDUSTRY, AND GOVERNMENT IN MAKING DECISIONS TO SATISFY

An informal arrangement was made with the State Water Resources Control Board and the 9 Regional Water Quality Control Boards whereby they will keep the Division informed about applications made by prospectors or miners for waste discharge requirements, and/or problems relating to mining and water quality. The Division will attempt to provide the Boards with specific information about mining or milling, or information on the minerals industry in general.

Mine safety instructions were written, approved, and distributed to all Division staff members. They are to be followed rigidly.

I. Before entering any underground mine works or any area around surface mine workings, all staff members shall read, and shall affirm with their signature that they have read, the following California Division of Industrial Safety Orders:

1. Mine Safety Order

2. Tunnel Safety Orders

3. Construction Safety Orders--extracts dealing with excavations and trenches

4. U.S.B.M. IC 7479--Young Man--Beware!

It is the responsibility of the Assistant District Geologists and the Safety Officer to see that this is done.

II. Never enter any underground mine workings, or any areas around surface mine workings in a casual manner. Be alert, and remain alert!

III. Always carry and wear appropriate equipment, which shall include as a minimum, DMG approved hard hat, sturdy boots, or safety boots, and if going in underground mine workings--three different sources of light (battery powered head lamp, carbide head lamp, flashlight, candle, and matches in waterproof container), 1 quart of water per man, and hand pick.

IV. In all cases where there is a question about entering into underground mine workings, or onto any areas around surface mine workings, the decision will rest with the field supervisor. In most cases underground workings should not be entered alone; however, if the field supervisor deems it safe, it may be done.

M. William Tilden of the Law Offices of Lonergan and Associates agreed to prepare a thorough revision of our "Legal Guide for California prospectors and miners". The "Legal Guide" is our best selling publication and merits the close attention given to its revision. It should be the best guide of its kind available anywhere.

To completely fulfill the requirements of newly enacted legislation (Section 2203 of the Public Resources Code), the Division will have to review the State's mineral needs, delineating problems of their economic utilization and conservation. The whole range of significant mineral commodities must be considered, but resources with the greatest economic and environmental significance should be given priority and those with the most immediate problems, such as the sand and gravel, carbonate rock, and clay industries will be given priority.

Sand and gravel mining near Tracy, California. Sand and gravel companies, which generally have their operations near large cities, presently face major problems because of competition for land use, such as housing and other urban development.

Marine Geology

The major effort in marine geology during fiscal year 1973-74 was the preparation of sediment distribution maps for the southwestern portion of San Francisco Bay for the years 1857,1898, 1931, 1956, and 1973. This project was done in cooperation with the State Lands Division. In a second coop with State Lands, marine geologic data were collected at Estero Bay, a potential supertanker port for Standard Oil, and at Port Hueneme.

A sand and gravel inventory was conducted for the City and County of San Francisco; and the reliability of the prediction of heavy metals in marine sediments was tested. Correlation between predicted values and measured values was good.

An extensive collection of subsurface geologic information from the offshore area was added to the Division's files.

Twelve EIRs were reviewed, five chapters of the California Coastal Commission's background paper were reviewed, and a number of papers by other agencies were reviewed.

Data on marine geology were provided as a part of CDMG's cooperative projects with Orange, Santa Clara, and Sonoma Counties, and with the City of San Diego.

An offshore geologic map of California was prepared by the Division's Marine Geologist for the State Lands Division. The initial draft of the map was field checked, and publication of the map is planned before the end of the 1974 calendar year.

Geophysics and Seismology

The geophysical and seismological sections have provided a variety of services to complement the Division's contributions to programs directed toward reducing the impact of geologic hazards on California's industry, commerce, and population, and directed toward providing basic geologic information of use to many segments of the California population. The services varied from performing geophysical surveys, to providing interpretations of newly acquired and existing geoscience information. Additional activity was created by both the passage of the Hospital Safety Act, and the efforts of communities preparing their seismic safety element.

Geophysical field support was provided for several cooperative investigations in the form of magnetic, gravimetric, and seismic surveys; these surveys provided information pertinent to the determination of local bedrock depth, identification of buried faults, and the variation of seismic velocity within local rock units. Approximately 160 km of profiles were obtained by the application of these methods. To facilitate the use of seismic profiling in cultural areas, a nonexplosive source was designed and used. The speed and accuracy of gravity meter readings was increased by the fabrication of a stable base

platform which may be placed directly over a gravity benchmark or other reference marker. Five cooperative geophysical investigations were undertaken during fiscal year 1973-74 in the Juniper Hills (Los Angeles County), Leona Valley (San Andreas fault, U.S.G.S.), San Diego metropolitan area (U.S.G.S.) and the counties of San Bernardino and Santa Clara.

During the past year, four additional California Bouguer gravity maps (scale 1:250,000) were published; these maps, referred to by their California geologic map sheet name, were: Death Valley, Kingman, Redding, and Weed. Two other Bouguer gravity maps (Trona and Santa Rosa) were made ready for publication, and the San Francisco and Santa Cruz maps have been revised for reissue. An additional six maps and their accompanying text material are at various stages of completion and are expected to be published during fiscal year 74-75.

Due to the interest in geothermal energy as a potential energy source, the Division undertook a geophysical study of the Clear Lake Geysers area in northern California; this study has been completed and is to be published during the next fiscal year.

The Division's seismology section has provided assistance to both State and local government organizations; these services have been performed on both a formal and an informal basis. These services were made possible through the Division's continued efforts in compiling and collecting seismicity data pertinent to the California earthquake environment. The seismicity data for 1910-1971 are now available for "in-house" use; it is expected that a preliminary version of the earthquake catalog will be available for general use during late 1974. Electronic computer codes are now available to provide listing and/or maps of seismicity data for required projects. Seismic safety elements are currently being prepared by many local governments. On a cooperative basis, local and regional epicenter maps have been prepared for the counties of San

The geodimeter, a laser beam ranging instrument, atop Mt. Diablo. The beam is used to measure the distance from one mountain top to another across a major fault. Changes in distance indicate contractions or dilations in the earth's crust.

Bernardino, Santa Clara, and Sonoma. Similar data have been supplied to the Departments of Water Resources and Transportation. Currently, this particular segment of the earthquake catalog is being expanded to include seismicity data prior to 1910 and after 1971. Earthquake magnitudes have been related to the areas shaken at various intensity levels, as a means of assigning magnitudes to major earthquakes that occurred prior to the development of seismographs.

Information relative to the dynamic nature of certain faults in California has been gathered by the seismological section; these efforts have been directed toward understanding the earthquake process and, as an ultimate goal, towards mitigation of the earthquake hazard. To progress toward these goals, a co-operative program of crustal strain measurements along the San Andreas fault system was continued with the U.S.G.S.; the Division completed a total of 60 geodetic measurements extending from the central Coast Ranges southward to the Anza Borrego desert. A progress report summarizing the data collected, reduced, and interpreted is in preparation. A high-accuracy short-range measuring instrument was acquired to provide an enhanced capability to assess fault activity.

Tiltmeters were operational at Gold Hill, Dillard, and Las Yeguas, California, during fiscal year 1973-74; these instruments are capable of measuring minute movements of the Earth's surface. This information, when interpreted in conjunction with other geophysical phenomena, such as seismicity, geodetic observations, telluric currents, and acoustic emissions, may provide insight into the cause of earthquakes. Four telluric current measuring sites were selected and instrumented along a 45-mile segment of the San Andreas fault system south of Parkfield. These naturally induced earth currents may show premonitory variations prior to the occurrence of an earthquake.

To supplement the geodetic, seismic, tilt, and telluric methods, six sites extending from Parkfield southward to Palmdale have been selected and monitored for acoustic emissions along the San Andreas fault. The goal is to determine if a correlation exists between the acoustical emission from an active fault zone and the imminence of an earthquake. Currently, the data recorded at several of the sites are being analyzed to determine the properties of the acoustic radiations and to locate their source.

Recently Mandated Activities

State Geologist Report

A bill (SB 893) to amend the Public Resources Code and calling for specific information in an annual report of the State Geologist was introduced by Senator Clare L. Berryhill of Modesto. It was signed into law by Governor Reagan on 17 September 1973 (Chapter 507, 1973).

This Chapter amends Section 2203 of the Public Resources Code to read:

> 2203. The State Geologist shall make an annual report to the director for transmission to the Governor on or before the 15th of September of each year. Such report shall include a section reviewing the status of measures taken in the state to counter geologic hazards and a section reviewing the economic utilization and conservation of the state's mineral resources and problems related thereto pursuant to Chapter 7.5 (commencing with Section 2650) of this division.

The reports called for in this Chapter (507, 1973) are included as a part of this annual report (geologic hazards on page 16 , and mineral resources on page 17).

Environmental Impact Reports

The Division has continued to review Environmental Impact Reports in 1973-74. Of the nearly 275 reports reviewed, about 60 percent came through the State Clearinghouse, and the remainder came directly to the Division from various persons and governmental agencies.

The Division reviews are concerned primarily with geologic hazards: the impact the project may have on the hazard as well as the impact the hazard will have upon the project. The geologic hazards considered are landsliding, flooding, erosion, expansive soil, volcanic eruption, tsunami, and subsidence, with special emphasis on earthquake shaking and fault rupture. Mineral resource conservation is also given purposeful evaluation in the review of EIRs.

EIRs dealing with subdivisions and waste treatment plants are the types of projects most frequently reviewed, although excavations and roadway realignments are common.

Solid Waste Management

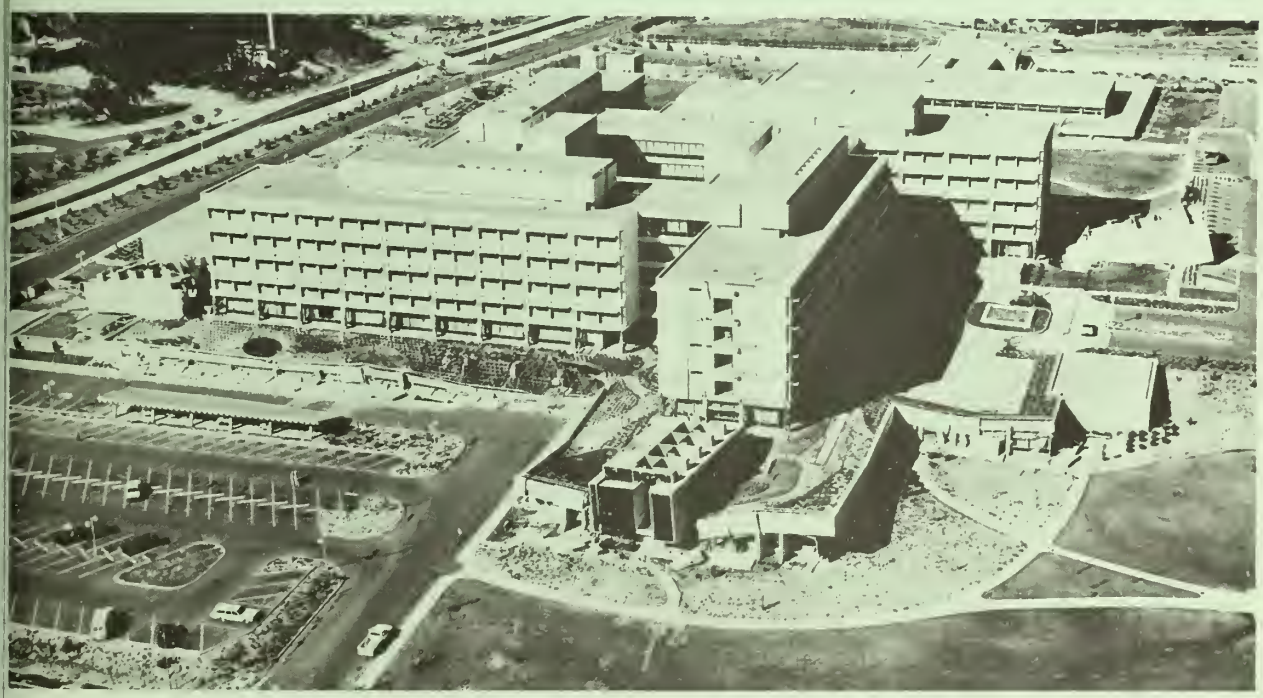
The Division continues to serve the Solid Waste Management Board by an appointment to the Resource Recovery Advisory Council. It reports on: geologic studies for Class 1, Class 2, and Class 3 disposal sites; containment standards for Class 1 sites; and rational location criteria for Class 1, Class 2, and Class 3 disposal sites. Economic studies of all types of disposal systems were begun; and evaluations of aluminum can recovery by magnetic tagging methods, transportation of refuse by slurry pipeline, pyrolysis for energy recovery, and dry-fueling for boiler feed were provided.

The rapid growth of the need for geologic input (studies) in the solid aste management fields has indicated that full-time geologic staff will be equired very soon. Hopefully the State Solid Waste Management Board will ontract for this service with CDMG to allow for maximum efficiency of man- ower and funds.

Hospital Safety Act

The Hospital Safety Act calls for the Department of Health to adopt rules nd regulations for the design and construction of hospitals. The Division f Mines and Geology, in cooperation with the Department of Health and in greement with the Office of Architecture and Construction, reviews reports f proposed hospitals to determine if the geologic environment of the sites re adequately described.

The Hospital Building Safety Board voted, at our request, to require eologic reports prior to design, rather than after. This will enable the eports to reflect the true geologic environment rather than being adjusted o fit the preconceived design of the structure.



Olive View Hospital after the 1971 San Fernando earthquake
Destruction of emergency services made the hospital inoperable after the quake. The Hospital Safety Act was designed to ensure that new hospital structures, including additions, reconstructions, and out-patient facilities, will remain functional both during and after an earthquake.

During 1973-74 116 reports were reviewed, with many sites having several reports each. A standard check-sheet method of review is used but direct contact with the report preparer is often necessary to resolve special problems This review task, together with attendance of board and commission meetings, has grown to a full-time activity in the Division totalling about 6 man-years of effort for the period. The quality of the reports that are submitted has significantly improved during 1974 as a direct result of review by CDMG staff. Guidelines for preparers (registered geologists) of these reports and samples of the check-list are available from the Division.

Alquist-Priolo Act

The Alquist-Priolo Geologic Hazard Zones Act which calls for the Division to delineate special studies zones bounding designated active faults in California became fully operational in 1973-74. Zones for the San Andreas, San Jacinto, Calaveras, and Hayward faults were prepared using 175 quadrangle maps containing these faults by the Division's six-man project team. Nearly one-half of these preliminary maps were revised by the Division using new data supplied by cities and counties contracted for that purpose.

Specific criteria to be used by local jurisdictions in carrying out the provisions of the Act were prepared by the State Mining and Geology Board and distributed by the Division along with an explanation of the special studies zones. The Board held 2 public hearings at which cities and counties and the public asked questions about implementation of the Act.

Final maps were prepared and copies readied to be sent to 43 cities, 20 counties, 37 State agencies, and several other Federal and local governmental jurisdictions on 1 July 1974; at which time they became official maps of the zones.

Planning was begun for zoning several additional faults in the State, including the Antioch, Buena Vista, Elsinore-Chino, Fort Sage, Garlock, Kern Front, Manix, Malibu Coast-Raymond, Newport-Inglewood, Owens Valley, Rogers Creek-Healdsburg, San Gregorio, Sierra Madre-Santa Susana-Cucamonga, Whittier, and White Wolf.

Strong-Motion Instrumentation Program

The Strong Motion Instrumentation Program, operated from Sacramento, completed its second year of operation. During this year, 162 sites as recommended by the Advisory Board, were field selected and 111 strong motion intruments were installed. As of 30 June 1974, 151 strong motion instruments had been installed by California Division of Mines and Geology and are in operation throughout California.

The Technical Staff assigned to the program now consists of a geophysicist, wo geologists, an engineering technician, and an electronic technician. A ield office was established in San Bernardino to cover southern California perations.

Plans for the next year will include the instrumentation of a number of elected structures and down-hole installations as well as continuing the ormal installation of instruments in various geological environments.

STRONG-MOTION INSTRUMENTATION ADVISORY BOARD

Members	Representing
H. BOLTON SEED (Chairman) Department of Civil Engineering University of California, Berkeley 94720	University of California Earthquake Engineering Research Center
FRANK K. McCLURE (Vice Chairman) McClure & Messinger 4009 Webster Street, Oakland 94609	Structural engineering
WILLIAM K. CLOUD Seismographic Station University of California, Berkeley 94720	University of California Seismographic Stations
L. LEROY CRANDALL LeRoy Crandall & Associates 711 N. Alvarado Street, Los Angeles 90026	Structural Engineers Association of California
C. MARTIN DUKE Department of Civil Engineering University of California, Los Angeles 90026	Earthquake Engineering Research Institute
ROBERT C. CASSANO Department of Transportation 1120 N Street, Sacramento 95814	California Department of Transportation
ALFRED GOLDBERG Superintendent of Building Inspection City and County of San Francisco 450 McAllister, Rm. 202, San Francisco 94102	Internation Conference of Building Officials
MARY W. HENDERSON (Vice Mayor, Redwood City) 3098 Muller Court, Redwood City 94601	League of California Cities

DONALD E. HUDSON California Institute of Technology Pasadena 91109	California Institute of Technology Earthquake Engineering Research Laboratory
LAURENCE B. JAMES Department of Water Resources 1416 Ninth St., Rm 215-48, Sacramento 95814	State Department of Water Resources
WILLIAM B. JOYNER U.S. Geological Survey 345 Middlefield Road, Menlo Park 94025	U.S. Geological Survey
R. B. MATHIESEN Seismic Engineering U.S. Geological Survey 390 Main St., Rm. 7067, San Francisco 94105	U.S. Geological Survey
JOHN F. MEEHAN Office of Architecture and Construction 1500 Fifth Street, Sacramento 95814	State Office of Architecture and Construction
L. DALE MILLS Kern County Director of Public Works 2601 O Street, Bakersfield 39901	County Supervisors Association of California
GORDON B. OAKESHOTT 6917 Vera Cruz Court, Citrus Heights 95610	Public
KARL V. STEINBRUGGE Insurance Services Office 465 California Street, San Francisco 94104	State Mining and Geology Board

Lists of Projects

URBAN MAPPING

Project	Staff	Status
City of San Diego	Kennedy	Drafts of two reports (parts of six 7 1/2' quadrangles) being processed for publication.
Sonoma County south coastal area, 1972-73	Huffman	Report published as Preliminary Report 20.
Sonoma County county-wide study to assist in preparation of general plan elements	Huffman, Armstrong	Investigation in progress.
Santa Clara County, Monte Bello Ridge study, 1971-72	Rogers, Armstrong	Report completed; in press.
Santa Clara County, south county study, 1972-73	Williams, Hart, Armstrong, Rogers	Report published as Preliminary Report 18.
Santa Clara County county-wide study to assist in preparation of general plan elements	Rogers, Williams	Investigations nearly complete; draft report submitted for review.
Marin County, Novato area, 1972-73	Rice	Report published as Preliminary Report 21.
Marin County, Novato and Fairfax-Upper Ross Valley areas	Rice, T. Smith	Investigations in progress.
Southern Ventura County	Weber, Miller, Cleveland, Mills*, Kahle, Kiessling, D. Morton*	Report released as Preliminary Report 14.
Orange County environmental geology	P. Morton, Fife, Miller	Preliminary Report 15 released. Final report being prepared.
Santa Cruz coastline study	Williams	Recessed. Some informal progress.

Projects cooperatively supported.
Geologist no longer with CDMG.

URBAN MAPPING (continued)

Project	Staff	Status
+West central Mt. Wilson 7 1/2' quadrangle, Los Angeles County	Saul	Report review completed, map being redrafted.
+East central Mt. Wilson and south half Azusa 7 1/2' quadrangles, Los Angeles County	D. Morton*	Special Report 105 released.
Southeast quarter Mint Canyon 7 1/2' quadrangle, Los Angeles County	Saul	Limited field mapping continued.
Southwest quarter Mint Canyon 7 1/2' quadrangle, Los Angeles County	Saul	Mapping complete. Repor being prepared as a Map Sheet.
Southwest quarter Walnut Creek 7 1/2' quadrangle, Contra Costa County	Saul	Map Sheet 16 released.
Northwest quarter Folsom 7 1/2' quadrangle, Sacramento County	Aune	Recessed. Report to be revised.
+Tri-Cities Project--El Cerrito, Richmond, and San Pablo in Contra Costa County, 1972-73	Bishop, Knox*	Report published as Preliminary Report 19.
+South half Mt. Baldy and southwest quarter Glendora 7 1/2' quadrangles, Los Angeles County	Streitz	Report being revised.
+Southeast quarter Oat Mountain 7 1/2' quadrangle, Los Angeles County	Saul	Explanation and cross-sections completed in draft.
+Southwest quarter Oat Mountain 7 1/2' quadrangle, Los Angeles County	Evans	Drafting underway.
+Calabasas-Thousand Oaks 7 1/2' quadrangles, Los Angeles County	Weber	Mapping and draft of rep reviewed. Revisions complete; maps being drafted.

+Projects cooperatively supported.
*Geologist no longer with CDMG.

URBAN MAPPING (continued)

Project	Staff	Status
†South half El Toro 7 1/2' quadrangle, Orange County	Fife	In press.
†Dana Point 7 1/2' quadrangle Orange County	Edgington*	In press.
†South half Canada Gobernadora 7 1/2' quadrangle, Orange County	P. Morton	Drafting underway.
†San Juan Capistrano 7 1/2' quadrangle, Orange County	P. Morton, Fife, Edgington*	Drafting underway.
†Laguna Beach 7 1/2' quadrangle, Orange County	Edgington*, Tan	Report reviewed and revised; map being drafted.
†Part of Juniper Hills 7 1/2' quadrangle, Los Angeles County	Barrows	Mapping continued.
†South half Tustin 7 1/2' quadrangle, Orange County	Miller, Tan	Mapping and draft of text completed.

SEISMICITY AND FAULT MOVEMENT

Project	Staff	Status
San Andreas fault, San Bernardino area	D. Morton*	Draft of map of Devore 7 1/2' quadrangle in review.
†Newport-Inglewood fault zone	Barrows	Report in press.
Earthquake damage analysis	Los Angeles District staff	On-site investigations of Pt. Mugu earthquake reported in California Geology.
Bedrock acceleration map	Greensfelder	Report being revised.
†San Fernando earthquake of 1971	Los Angeles District staff	Bulletin 196 in press.

†Projects cooperatively supported.
*Geologist no longer with CDMG.

SEISMICITY AND FAULT MOVEMENT (continued)

Project	Staff	Status
+Geodimeter Program, San Andreas fault system	Bennett, Rodgers Greensfelder	Continued field measurements and data analysis Report in preparation.
Tiltmeter Program	Bennett, Bacon, Durrwachter, Greensfelder, Toppozada	Four tiltmeters install results being analyzed.
Micro-acoustic rock-strain monitoring	Bacon, Durrwachter	Six sites are being monitored monthly.
Strong-Motion Instrumentation Program	Wells, Bacon Bendixen*, Morrow Power, Real, La Gesse	151 instruments install by 30 June 1974
Catalog of California earthquakes	Greensfelder, Rodgers, Peacock,* Higgins, Sherburne, Newkirk, Donihoo	Epicenter and intensity tapes complete except f minor corrections and additions. Computer program debugged.
Mechanics of faulting in the Transverse Ranges	Rodgers	Report completed; being reviewed.
Telluric current self-potential	Bacon, Durrwachter	Four arrays along the San Andreas fault are being monitored monthly

ENVIRONMENTAL GEOLOGY

Project	Staff	Status
Wrightwood mudflows	D. Morton*	Report reviewed and being revised.
Wright Mountain landslide	D. Morton*	Report revised to accompany paper on Wrightwood mudflows.

+Projects cooperatively supported.
*Geologist no longer with CDMG.

ENVIRONMENTAL GEOLOGY (continued)

Project	Staff	Status
Landsliding in coastal regions	Cleveland	
Landsliding and climate		Field work completed; reports in preparation.
Landsliding in marine terrace terrain		Drafts of reports completed; in review.
California master plan for urban geology--U.S. Department of Housing and Urban Development	Alfors, Gay, Burnett	Published as Bulletin 198.
Real estate tract reviews	Fife, Stinson, Kiessling	For the California Department of Real Estate (under contract terminated March 1974).
San Fernando earthquake	Oakeshott** et al.	In press as Bulletin 196.
Marin headlands	Bedrossian	Published in April 1974 California Geology.
Sierra foothills	Burnett	Office report completed.

AREAL GEOLOGY

Project	Staff	Status
Haiwee Reservoir and Keeler quadrangles	Stinson	Work in progress; for publication as a Map Sheet.
Bodie quadrnagle	Chesterman, Gray	In press.
Santa Margarita area, San Luis Obispo County	Hart	In press.
Matterhorn Peak quadrangle	Chesterman	In press.

*Projects cooperatively supported.
**Geologists no longer with CDMG.
***Retired December 1972.

AREAL GEOLOGY (continued)

Project	Staff	Status
North half Confidence Hills quadrangle	Troxel*, Wright*	Authors revising.
South Chittenden and San Juan Bautista quadrangles	Bishop	Recessed.
Hollister and San Felipe	Rogers	Project continues on part-time basis; investigations in progress.

GEOCHEMICAL

Project	Staff	Status
Atomic absorption analysis of gold and silver	Majmundar, C. Smith	Work in progress for development of analytical procedure.
Mineral separation for potassium-argon age determinations	Majmundar, Lofgren, C. Smith	Separated biotite and hornblende from other rocks.
Physical testing of soil samples	Majmundar, Borchardt, Lofgren, Deneau	Used physical tests on sedimentary materials (particle size distribut and Atterberg tests); bulk and clay mineralogy determined by x-ray diffraction; worked on samples submitted by geologists.
Monterey Basin geochemical background studies on stream sediment samples	Majmundar	Report revised and resubmitted.
Sampling boat technique for atomic absorption analysis	Majmundar, C. Smith	Work in progress for development of procedure to determine heavy metal at the parts per billion level.

*Geologist no longer with CDMG.

GEOCHEMICAL (continued)

Project	Staff	Status
ater analysis	Majmundar, C. Smith	Work in progress for development of analytical procedures for arsenic and chlorine.
-ray diffraction analysis f clay minerals	Majmundar, Borchardt, Lofgren	Work in progress.
-ray fluroescence analysis or potassium and phosphorus	Majmundar, Borchardt, Lofgren	Completed procedure development.
omputer program evaluation	Borchardt	In progress.
ptical emission spectro-graphic analysis	Majmundar, C. Smith	Procedure development in progress.
andslide studies	Borchardt, Lofgren, C. Smith, Deneau	Work in progress on chemical stabilization.
onterey Basin geochemical studies on cadmium and other elements in bedrock samples	Majmundar, C. Smith	Report completed and submitted.

MINERAL RESOURCES

Project	Staff	Status
imestone and dolomite resources f California, introduction to	Bowen*, Evans	Published as Bulletin 194.
imestone, dolomite, and shell esources of the Coast Ranges rovince	Hart	In press as Bulletin 197.
imestone and dolomite resources f the Klamath Mountains Province	Evans	Being revised.
imestone and dolomite resources f the Mojave Desert Province	Bowen*, Gray	In preparation; minor effort this year.
imestone and dolomite resources f the Transverse Ranges Province	Gray	In preparation; minor effort this year.

*Geologist no longer with CDMG.

MINERAL RESOURCES (continued)

Project	Staff	Status
Bodie mining district	Chesterman Gray, Chapman	Report being reviewed.
Mother Lode Guide book (revision of Bulletin 141)	Clark, Hill	In progress.
Geology of the southern Mother Lode	Evans	Being reviewed.
Silver, Calico silver district	Weber	Recessed.
Mine waste water and water use	Evans, Davis	Being reviewed.
Geothermal resources of California	Bacon	Kept abreast of developments. Draft EIR for The Geysers completed.
Mineral needs of California	Chesterman, Evans, Kelley Knox*, Rapp	Some portions completed; others in progress.
Sacramento County sand and gravel	Rapp	Being processed for publicat
Sierra Nevada mine wastes	Clark	Being reviewed.
Striped Mountain carbonate rocks	Evans	Being reviewed.
Orange County sand and gravel	Evans	Published in November 1973 California Geology.

COUNTY REPORTS--MINES AND MINERAL RESOURCES

Project	Staff	Status
Alpine County	Clark	In press.
Imperial County	P. Morton	In process for publication.
Riverside County	Saul, Evans, Gray	Being reviewed.

*Geologist no longer with CDMG

COUNTY REPORTS--MINES AND MINERAL RESOURCES (continued)

Project	Staff	Status
sta County	Lydon*, O'Brien**	Published as County Report 6

GEOLOGIC MAPS

Project	Staff	Status
ath Valley Geologic Map Sheet, ale 1:250,000	Streitz, Stinson	Revision in progress.
ate Geologic Map, Scale 1:750,000	Jennings, Stinson	Nearing completion
ate Fault Map, Scale 1:750,000	Jennings, Stinson	Preliminary version published, Preliminary Report 13; final version in progress.
dex to Geologic Maps of lifornia 1970-72	Kiessling	Partly complete.
dex to Graduate Theses on lifornia geology 1969-72	Taylor	Text ready for printing; map being drafted.

GEOPHYSICAL
(Other Than Seismic and Fault Investigations)

Project	Staff	Status
uguer Gravity Map of California, ale 1:250,000	Chapman, Taylor Bishop, Bendixen*, Chase	Published: Death Valley, Kingman, Redding, Trona, Weed. In press: Santa Rosa In progress: Bakersfield Fresno, Los Angeles Salton Sea, San Diego-El Centro, San Jose, Santa Maria, Ukiah.

eologist no longer with CDMG
etired 1970

GEOPHYSICAL (continued)
(Other Than Seismic and Fault Investigations)

Project	Staff	Status
Bouguer Gravity Map of California, Scale 1:750,000	Chapman, Chase	North half completed; south half 50 percent completed.
Ione geophysical study	Chapman, Bishop	Being processed for publication as a Special Report.
Port Wine area study	Chapman, Clark	Report in progress.
Clear Lake-The Geysers study	Chapman	Being processed for publication as a Special Report.
Aeromagnetic Map of California, Scale 1:750,000	Chase	Compiled available data
Bodie Hills gravity, geology, aeromagnetics, and anomalies	Chapman	Report being reviewed.
Gravity leveling study	Chase, Chapman	Began monitoring select stations for changes in gravity.
Geophysical support was provided for these cooperative projects: +Los Angeles County +Marin County +San Bernardino County +Santa Clara County +City of San Diego (USGS) +Leona Valley, Los Angeles County (USGS)	Chapman, Chase	Results of the geophysical studies are, or will be included in the final reports on the projects

MARINE GEOLOGY

Project	Staff	Status
Bottom lithology map of offshore areas, Oregon to Mexico	Welday*, Williams, Anderson	Preliminary maps completed; final drafting underway; publication expected by end of 1974.

*Geologist no longer with CDMG.
+Projects cooperatively supported.

MARINE GEOLOGY (continued)

Project	Staff	Status
outh San Francisco Bay urvey	Welday*, Williams	Study complete; report being prepared.
an Diego offshore surveys	Welday*, Kennedy	Study complete; report being prepared.
valuation of sand and ravel potential in parts f San Francisco Bay	Welday*	Study completed; report prepared.
ffshore surveys, central nd southern coast	Welday*	Study continuing on distribution of mercury, copper, lead, zinc, cadmium, and chromium in sediments.

*Geologist no longer with CDMG

GEOLOGIC DATA ELEMENT

The objective of the Geologic Data Element is to provide the citizens of California with geologic information relevant to their lives and livelihoods. The Geologic Data staff compiles and disseminates the results of studies made by staff members of the California Division of Mines and Geology and others in the earth sciences profession. This is done in a variety of ways: by formal publications, by letter, by informal leaflets, by technical and semi-technical illustrated talks, and by personal contact.

The thousands of inquiries received annually by the Division are answered efficiently and effectively by supplying copies of the CDMG notes, and California Geology, and by direct transmission of the knowledge that the staff possesses.

Information Desks and Mail Inquiries

The thousands of inquiries received annually by the Division are answered efficiently and effectively by supply copies of the CDMG notes, and California Geology, and by direct transmission of the knowledge that the staff possesses.

During the year, interest in earthquakes continued high. The Division's Special Publication 39 "Earthquakes: be prepared!" was distributed by the Department of Education's Office of Civil Defense Education and Disaster Preparedness to teachers trained in disaster education techniques. Other Division material on earthquakes was also widely distributed.

During part of the fiscal year we published a quarterly periodical called California Earthquake Science Newsletter. The Earthquake Science Newsletter was intended to broaden the scope of, and to supersede the Crustal Movement Investigations Newsletter which had been published intermittently by the Division starting in 1970. The purpose of both publications was to report news in the fields of seismology, geodesy, geophysics, and earthquake related geology. It was thought that scientists investigating earthquakes would be able to use a forum that would specifically include up-to-date news related to their field and that the audience would be different from the readers of California Geology, but they are apparently the same.

The February 1974 issue of the Earthquake Science Newsletter was the last issue printed. In the future, articles that would have appeared in the Earthquake Science Newsletter will be printed in California Geology.

At the end of the fiscal year, the Division had completed arrangements to reprint The Final Report of the Legislature Joint Committee on Seismic Safety, "Meeting the earthquake challenge." Distribution of the reprint will also be handled by the Division.

With the rising price of gold, interest in gold and minerals continued to increase. The "Gold Pak", a collection of 21 CDMG Notes, was mailed to 2850

ersons. An order form for CDMG publications about gold and mining, included n the "Gold Pak", proved its value by being returned by many correspondents esiring to purchase additional Division publications and 662 requests for nformation about minerals other than gold were answered.

The Division's "Schoolite Kit", a collection of hand specimens of 50 rocks nd minerals found in California, was sent to 104 schools.

Several mailings were completed, including: Bulletin 198, Urban geology aster plan for California to California cities and counties participating in he Department of Housing and Urban Development grant for the study; Special ublication 42, Index map to special studies zones, and related material, to ffected cities and counties; Special Report 108, 1st Annual report of the trong-Motion Instrumentation Program to over 500 interested parties; and ngineering Geology studies questionnaire to local governments.

ineral Museum

Discussion continues regarding a possible relocation of the mineral xhibits, however, the matter no longer carries the urgency that it once had. he museum, located on the second floor of the Ferry Building in San Francisco, s open to the public from 8 a.m. until 5 p.m., Monday through Friday. It s no longer open on the first Saturday morning of each month.

ibrary

The library has been organized to provide better service to the public and o the staff of the Division. This is a reference library of material relative o the geology and mineral resources of California.

ublications

The Geologic Data staff publishes and distributes the results of technical tudies of California geology as promptly, concisely, attractively, and conomically as practicable. The staff reviews the technical content of anuscripts, drafts illustrations, does cartography of the maps, processes the anuscript and map editorially, coordinates the printing and lithography, egotiates contracts, manages the printing budget, and supervises the distribution f the final printed report. Revenue from the sale of Division publications uring fiscal year 1973-74 was $97,300.

lew Publications Released

Bulletin 194. The mineral economics of the carbonate rocks--limestone and dolomite resources of California, by Oliver E. Bowen, Clifton H. Gray, Jr., and James R. Evans. $4.00.

Bulletin 198. Urban geology master plan for California, by John T. Alfors, John L. Burnett, and Thomas E. Gay, Jr. $2.50.

Special Report 105. Geology of parts of the Azusa and Mount Wilson (7 1/2') quadrangles, San Gabriel Mountains, Los Angeles County, California, by Douglas M. Morton. $4.50.

Special Report 108. The first annual report of the strong-motion instrumentat program, prepared under the direction of James E. Slosson, State Geologist.

County Report 6. Mines and mineral resources of Shasta County, by Philip A. Lydon and J.C. O'Brien. $7.50.

Special Publication 42. Index to maps of special studies zones. $1.00.

Special Publication 43. Mineral producers in California for 1971, compiled by Fenelon F. Davis. $2.00.

Special Publication 44. Potential disposal sites for class 1 waste in souther California, by John L. Burnett and Gary C. Taylor. $1.00.

Map Sheet 16. Geology and slope stability of the SW 1/4 of the Walnut Creek (7 1/2') quadrangle, Contra Costa County, California, by Richard B. Saul. $3.50.

Map Sheet 18. Geology of the NE 1/4 Shoshone 15' quadrangle, Inyo County, California, by Charles W. Chesterman. $2.00.

Preliminary Report 13. Preliminary fault and geologic map of California, compiled by Charles W. Jennings. $5.00.

Preliminary Report 14. Geology and mineral resources study of southern Ventur County, California, by F. Harold Weber, Jr., George B. Cleveland, James E. Kahle, Edmund F. Kiessling, Russell V. Miller, Michael F. Mills, and Douglas Morton, and Blase A. Cilweck. $7.00.

Preliminary Report 15. Geo-environmental maps of Orange County, California, b Paul K. Morton, Russell V. Miller, and Donald K. Fife. $2.50.

Preliminary Report 16. Geology for planning on the Sonoma County coast betwee the Russian and Gualala Rivers, by Michael E. Huffman. $3.00.

Preliminary Report 18. Environmental geological analysis of the south county study area Santa Clara County, California, by Charles F. Armstrong, Earl W. Hart, and Thomas H. Rogers. $3.00.

Preliminary Report 19. Geological and geophysical investigations for tri-cite seismic safety and environmental resources study, by Charles C. Bishop, Richard D. Knox, Rodger H. Chapman, Donald A. Rogers, and Gordon B. Chase. $4.00.

reliminary Report 20. Geology for planning on the Sonoma County coast between the Russian River and Estero Americano, by Michael E. Huffman. $4.00.

reliminary Report 21. Geology and geologic hazards of the Novato area, Marin County, California, by Salem J. Rice. $4.00.

eath Valley Sheet, Bouguer gravity map of California, Scale 1:250,000, by Rodger H. Chapman, D. L. Healey, and Bennie W. Troxel. $2.00.

edding Sheet, Bouguer gravity map of California, Scale 1:250,000, by Andrew Griscom. $2.00.

eed Sheet, Bouguer gravity map of California, Scale 1:250,000, by Chong K. Kim and H. R. Blank, Jr. $2.00.

ixty-sixth Annual report of the State Geologist.

ublications reprinted

ulletin 190. Field Trip B: San Francisco peninsula, by M. G. Bonilla and Julius Schlocker. 1966. 50¢. First printing.

ulletin 190. Geology of Northern California, edited by Edgar H. Bailey. 1966. $6.00. Third printing.

pecial Publication 38. Site characteristics of southern California strong motion earthquake stations, by C. Martin Duke and David J. Leeds. $2.00. Second printing.

pecial Publication 40. Legal guide for California prospectors and miners, by Charles L. Gilmore and Richard M. Stewart. 1962. $1.00. Addenda to 1973. Fifth printing.

pecial Publication 41. Basic placer mining, revised from Mineral Information Service, Vol. 10, no. 8 August 1957. 10¢. Second printing.

an Diego-El Centro Sheet, Geologic map of California, Scale 1:250,000, compiled by Rudolph G. Strand. 1962. $1.50. Second printing.

lap of Los Angeles County showing mines and mineral deposits, by Tom E. Gay, Jr. 1954. 35¢. First printing.

eath Valley Sheet, Geologic map of California, Scale 1:250,000, compiled by Charles W. Jennings. 1958. $1.50. Fourth printing.

ingman Sheet, Geologic map of California, Scale 1:250,000, compiled by Charles W. Jennings. 1961. $1.50. Second printing

Salton Sea Sheet, Geologic map of California, Scale 1:250,000, compiled by Charles W. Jennings. 1967. $1.50. Third printing.

San Francisco Sheet, Geologic map of California, Scale 1:250,000, compiled Charles W. Jennings and John L. Burnett. 1961. $1.50. Third printing.

Santa Ana Sheet, Geologic map of California, Scale 1:250,000, compiled by Thomas H. Rogers. 1966. $1.50. Second printing.

Weed Sheet, Geologic map of California, Scale 1:250,000, compiled by Rudolph Strand. 1963. $1.50. Second printing.

Major articles in CALIFORNIA GEOLOGY

Pleistocene Lake San Benito.
Probe of global tectonics.
Little things in life (microfossils).
Death of Ice Age pigs recounted.
Tiltmeters in California.
Fault activity detected.
Earthquake and flood insurance.
Antarctic graveyard for radioactive wastes.
Quarry to mill by pipeline
Kennecott work-study program for Mackay students.
Plates move at different rates.
Mining, waste dischage requirements, and water quality.
CDMG helps find kidnapper.
Sonoma County coastal geology for planning.
Extraction of sand and gravel in Orange County, California.
Palygorskite found in the northern Puente Hills near Pomona.
New mineral in Trinity County.
Some features produced by the earthquake of 21 February 1973, near Point Mugu, California.
Mining activity in California July 1972 through June 1973.
Model for the origin of Sierran granites.
National Registry of Natural Landmarks.
Glaciers--a picture story.
Joint Committee on Seismic Safety publishes final report.
I was there (during 4 earthquakes).
South Santa Clara County study.
Geodetic survey map shows crustal movement.
Geology of the Marin Headlands.
The earthquake trail at Point Reyes National Seashore.
Chemical stabilization of landslides by ion exchange.
Review of new hospital sites for seismic safety.
New state fossil (Smilodon californicus, the saber-tooth cat).

What price gold?
Mineral production in California (statistics for 1972).
New method tested [by CDMG] in geophysical study.
1973 a "slow year" for earthquakes.
Shoshone, Inyo County, California, area mapped.

New CDMG Notes

32. Assessment work on mining claims.
34. Meteorites.
35. Geomorphic provinces and some principal faults in California.
36. How to order CDMG publications.
37. Guidelines to geologic/seismic reports.
38. Sabre-tooth cat: state fossil.
39. CDMG photo file.
40. Map of California showing 35 mineral resources.

Revised CDMG Notes

11. Earthquake articles in MIS 1960-1970.
12. Gold refineries.
13. Possible sources of gold nuggets.
14. State geological surveys of the United States.
16. Smelters in the western United States.
19. Mining legal forms.
20. Information for schools.
22. Gold: state mineral, serpentine: state rock.

COOPERATIVE ACTIVITIES

The Division conducts a number of geological studies in cooperation with local governments, other State agencies, and Federal agencies. The studies are designed to meet the need for information about actual or potential areas of geologic hazard or for information about mineral resources. Some of the studies are conducted to demonstrate the need for, and the usefulness of, geology to local government planning, building, and public works agencies. Other projects are conducted to accelerate progress on Division projects or to enable the Division to begin projects sooner than could otherwise be done. Cooperative activities are funded jointly by the Division and the cooperating agency under various arrangements--the nature of which depends upon the availability of funds and personnel, the relative urgency of the project to the State and to the cooperating agencies, and other factors.

LOCAL GOVERNMENTS

Los Angeles County

The Department of the County Engineer and the Los Angeles County Flood Control District provided funds to accelerate the Division's geologic studies in the county.

Field mapping continued in the Juniper Hills 7 1/2' quadrangle along the San Andreas fault and in the Mint Canyon 7 1/2' quadrangle. A draft report on the geology of the south half of the Mint Canyon 7 1/2' quadrangle was completed, as was a draft report on the slope stability of the southwest quarter of the quadrangle. The report for the southeast quarter of the Oat Mountain 7 1/2' quadrangle was completed and submitted for publication. The report for the Calabasas and the Thousand Oaks 7 1/2' quadrangles was complete. Report preparation was begun for the south half of the Oat Mountain 7 1/2' quadrangle. Publication processing continued on the Special Report of the Newport-Inglewood structural zone. Report preparation continued for the south halves of the Glendora and Mt. Baldy 7 1/2' quadrangles, the west-central one-third of the Mt. Wilson 7 1/2' quadrangle, and the Palos Verdes Hills area Special Report 105 (east-central one-third of the Mt. Wilson and the south half of the Azusa 7 1/2' quadrangles) was published.

Marin County

The Planning Department provided funds to accelerate the Division's geologic studies in the county.

A report of the geologic and geophysical investigations conducted in the south half of the Petaluma River and north half of the Novato 7 1/2' quadrangl was completed and published as Preliminary Report 21. Geologic studies were begun in the eastern part of the San Geronimo, south half of the Novato, and north half of the San Rafael 7 1/2' quadrangles.

Orange County

The Department of Building and Safety, the Road Department, and the Orange County Flood Control District provided funds to accelerate the Division's geologic studies in the county.

Preliminary geo-environmental maps of Orange County were published as Preliminary Report 15. An environmental geology report was prepared for the entire county. Detailed geologic mapping was completed for the south half of the Tustin 7 1/2' quadrangle and a geologic report was in preparation. The draft geologic report for the Laguna Beach 7 1/2' quadrangle was completed. The geologic reports for the Dana Point, El Toro, Canada Gobernadora, and San Juan Capistrano 7 1/2' quadrangles were being processed for publication as Special Reports 109, 110, 111, and 112 respectively.

San Bernardino County

The Planning Department provided funds and the U.S. Geological Survey provided services to accelerate the Division's geologic studies in the county.

The geologic, geophysical, and seismological studies in the southwestern part of the county were completed and a report of the investigations was being processed for publication as Special Report 113.

San Pablo City

The report for the geological and geophysical investigations for the tri-cities seismic safety and environmental resources study completed in fiscal year 1972-73 was published as Preliminary Report 19.

Santa Clara County

The Planning Department provided funds to accelerate the Division's geological studies in the county.

A county-wide geologic investigation was initiated to provide basic data for use by the County in preparing the seismic safety element of the general plan. The environmental geology analysis of the south county study area completed in fiscal year 1972-73 was published as Preliminary Report 18. The geologic report on the Monte Bello Ridge area was in press to be released as Preliminary Report 17

Sonoma County

The Planning Department provided funds to accelerate the Division's geologic studies in the county.

The report on geology for planning on the Sonoma County coast between the Russian River and Estero Americano completed during fiscal year 1972-73 was published as Preliminary Report 20. Work was initiated on a county-wide study to provide basic data for use by the County in preparing the seismic safety element of the general plan.

Ventura County

The report and maps resulting from the geological investigation of the south half of the county completed in fiscal year 1971-72 were published as Preliminary Report 14. Work was begun on a geologic study of the more densely populated parts of the county to provide basic data for use by the County in preparing the seismic safety element of the general plan.

STATE AGENCIES

State Office of Architecture and Construction

1. Hospital Safety Act

Under the Hospital Safety Act (Health and Safety Code) which became effective 7 March 1973 all new hospitals including additions, reconstructions, and out-patient facilities shall be functional during and after an earthquake or other natural disasters.

In agreement with the State Office of Architecture and Construction (OAC) the California Division of Mines and Geology (CDMG) provides the review of geologic/seismic reports which are submitted by consulting engineering geology firms. Applying CDMG Note 37, "Guidelines to Geologic/Seismic Reports", the Division's geologists and seismologists review the reports to determine whether or not the submitted information is acceptable.

During fiscal year 1973-74 the CDMG reviewed 118 new reports and over 200 supplemental reports which were requested to provide additional data. The review procedure has become formalized for rapid and consistent review of the conclusions and supporting data on geology and seismicity. In the beginning, up to 3 or 4 supplemental reports were requested but by the end of the fiscal year an average of only 1 supplemental report was requested.

Certain controversies still remain, especially as to the CDMG's requiremer for ground acceleration information. Because OAC has procedures which allow for certain buildings to be designed by factors other than those stated in geologic/seismic reports, a continuing discussion on this matter has evolved among the geotechnical and structural engineers subcommittees as to the information requested by CDMG in reviewing the geologic/seismic reports.

Future decisions by the State Building Safety Board may significantly alte the present procedure.

2. School Siting

The Division was asked to review the geologic/seismic problems of alternative sites for a new school for the blind in the Fremont and Concord area. This was the first request the Division ever received in which the geologic/seismic input would be provided by the Division for the analysis for school sites.

The geologic/seismic report prepared by the CDMG recommended that additional studies be made on foundation problems including the potential for liquefaction due to the nearby Hayward fault and the saturated alluvial foundation material. DAC has prepared a contract for a consulting engineering geology firm to acquire the additional geologic/seismic information.

California Department of Real Estate

In November 1973 the Department of Real Estate and the California Division of Mines and Geology mutually agreed on a new procedure which would improve upon the old procedure by providing for certification by the building official, design civil engineer, soils engineer, and engineering geologist as to the identification and mitigation of geologic hazards. The authority for this new procedure was derived from Chapter 70, Uniform Building Code.

From November 1973 to March 1974 seventy-four subdivision reports were reviewed under this procedure. The majority of these reports were not acceptable, mainly for the reason that most local governments do not adopt and enforce Chapter 70, UBC or an equivalent ordinance. The experience gained by the Division over this period of time indicated that the great majority of subdivision reports submitted for review did not meet the minimum standards of Chapter 70, Uniform Building Code.

The agreement with the Department of Real Estate whereby the California Division of Mines and Geology reviews information relating to the discussion on geologic hazards for final subdivision public reports was terminated during March 1974 and replaced by the Department of Real Estate with a procedure whereby the Department of Real Estate might ask the Division to review a few selected reports.

State Lands Division

A major effort for the State Lands Division was a study of the history of sedimentation in south San Francisco Bay. This study, conducted at the request of the State Attorney General's office, resulted in a series of sediments distribution maps for the period 1857 to 1973. Laboratory tests on sediment samples included size analysis, X-ray diffraction, shell quantity, and pollen content.

Marine geologic data was obtained at Port Hueneme, and also at Estero Bay, a proposed supertanker port.

Division of Oil and Gas

The Division provided input to a master EIR guideline for the geothermal area at The Geysers area. This guideline was approved. The guideline will require greater consideration of geologic hazards involving landslides, erosion and seismicity associated with the geothermal development.

State Water Resources Control Board and Regional Water Quality Control Boards

The Division continued to provide information and advice to the State and Regional Boards on request and to conduct investigations relative to waste disposal sites.

University of California at Berkeley

The Seismological Station provided the Division with detailed information on California earthquakes under the terms of a continuing agreement. The Division is notified by telephone of the location and magnitude of earthquakes greater than magnitude 5 in northern and central California so that an earthquake-response team may be deployed rapidly to evaluate potential geologic hazards in affected areas.

Other Cooperative Services

In addition to the funded cooperative or contract projects, the Division participated in a number of interagency activities. A partial listing of the inter-agency groups in which the Division was represented during the fiscal year is as follows:

Advisory Board to Strong Motion Instrumentation Program
Advisory Committee on Geographic Names
Advisory Group to Joint Legislative Committee on Seismic Safety
Archaeological Study Task Force
Building Safety Board (Department of Health)
Geothermal Resources Board
Governor's Earthquake Council
Governor's Interagency Earthquake Committee
Land Use Study Committee (Office of Planning and Research)
Monterey Basin Pilot Monitoring Project Committee
Power Plant Siting Committee
State Solid Waste Management Board
State Solid Waste Management and Resources Recovery Advisory Council
Technical Advisory Committee to Geothermal Resources Board
Technical Advisory Committee to San Francisco Bay Conservation and Development Commission

In addition to services furnished on a continuing basis, the Division provided a wide variety of short-term services to other State agencies upon request.

FEDERAL AGENCIES

. S. Bureau of Mines

The long-standing cooperative agreement between the Bureau and the ivision concerning the collection of statistics of annual mineral production ontinued. The 1972 county production figures were published in the June 1974 alifornia Geology.

. S. Geological Survey

The USGS provided funds for geological studies by the Division along the an Andreas fault in Los Angeles County, along the Elsinore fault in Riverside ounty, and along potentially active faults in the metropolitan San Diego area f San Diego County. The studies were initiated at the end of the 1972-73 iscal year and continued in fiscal year 1973-74.

The cooperative agreement for investigation of geology in California nitiated in 1946 continued.

The Division provided limited financial support for USGS investigations ilong the Elsinore fault in San Diego County. The Survey continued to :ooperate with the Division in crustal strain measurements by conducting ieasurements along the north half of the State Geodimeter Network in lieu of roviding financial support as in previous years; the Division conducts ieasurements along the south half.

By informal agreement, the Seismological Field Survey maintains iccelerographs installed by the Division's Strong-Motion Instrumentation 'rogram. The Seismological Field Survey also collects and develops records jenerated by this program.

OTHER ORGANIZATIONS

California Institute of Technology

Under a continuing agreement with the Seismological Laboratory, the Division provides funds toward the expense of performing services in connection with the recording and study of earthquakes in California. CIT provides prompt notification by telephone of the location of all earthquakes greater than Richter magnitude 4.5 in southern California.

OTHER COOPERATIVE ACTIVITIES

The Division continued to cooperate with Federal, State, county, and cit agencies, universities and colleges, professional groups, private companies, and individuals without formal contracts or matching funds, often on an individual basis, by exchanging information on the geology and the mineral resources of California. Many of the activities listed elsewhere in this Report have been materially assisted by such cooperation. Examples of some o these cooperative ventures are given here:

Access to libraries has been provided to Division staff by various colleges and universities. University of California campuses at Los Angeles, Riverside, and San Diego (Scripps Institution of Oceanography) and the California Polytechnic State University campus at San Luis Obispo also provide office space.

The long-standing cooperation with the California Academy of Sciences continued with the Division's Senior Geological Scientist Charles W. Chesterman serving as the Academy's Honorary Curator of Minerals.

The Hancock Foundation of the University of Southern California, the National Science Foundation, the U. S. Geological Survey, and the California Department of Fish and Game cooperated in the Division's marine geology studies.

BUDGET SUMMARY

An increase in the estimated total net expenditure ($2,085,321) for fiscal year 1973-74 over the preceding fiscal year ($1,487,842) is due in part to a general increase in the cost of doing business. However, the primary cause of the significant increase was an intensified Division effort in seismic risk studies, particularly fault investigations, and the first full year of operation of the Alquist-Priolo Special Studies Zones project. The estimated total cost of operation of the Division, in the form of personal services, operating expenses, and equipment, amounted to $2,986,562 as compared to $1,991,418 for the preceding year. The increase in total cost, which amounted to slightly less than 50 percent, reflects the acceleration of the Strong-Motion Instrumentation Program as well as an intensified Division effort in general geologic hazard studies.

Estimated Expenditures

Personal services		$1,637,946
Operating expenses		951,475
General expense	$112,298	
Printing	206,665	
Communications	31,598	
Travel, out of state	3,380	
Travel, in state	56,097	
Motor vehicle operation	28,803	
Consulting services	141,966	
Facilities operation	172,415	
Engineering reproduction	36,149	
Specialized training	2,903	
Electronic data processing	8,712	
Equipment		397,141
Total expenditures		2,986,562
Reimbursements		-901,241
TOTAL ESTIMATED NET EXPENDITURE		$2,085,321

THE FUTURE

While activities related to geologic hazards will continue to be a major part of the Division's program, the energy shortage has refocused Division attention on California's continuing reliance on mineral raw materials. The Division is completing a planning study to evaluate the State's mineral resourc needs through the year 2000 and to determine what should be done to assure that those needs will be met. The study will serve to anticipate and thereby hopefully mitigate future shortages of essential mineral materials. It should also define an optimum role for the Division and the State in the mineral resources field.

The review of Environmental Impact Reports, Hospital Site Investigations and Rural Subdivision reports is expected to continue to require significant staff time by the Division.

The Division hopes to expand its earthquake warning studies, and to be able to evaluate earthquake warnings that are received by the State. Governor Reagan appointed the Earthquake Prediction Advisory Group under the jurisdictio of the Office of Emergency Services, with the State Geologist as the secretary. The function of the Advisory Group, which includes CDMG seismologist Dr. Roger W Sherburne, is to evaluate the credibility and reliability of predictions of earthquakes. If the prediction warrants, Governor Reagan and OES will be alert so that steps can be taken to safeguard the public.

It is the Division's intent to expand studies of suspect faults to acquire knowledge concerning their current and recent "activity". The seismologists of the Division also plan to develop a ground-shaking calculation capability.

APR 6 '85

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ARE SUBJECT TO RECALL AFTER ONE WEEK.
RENEWED BOOKS ARE SUBJECT TO
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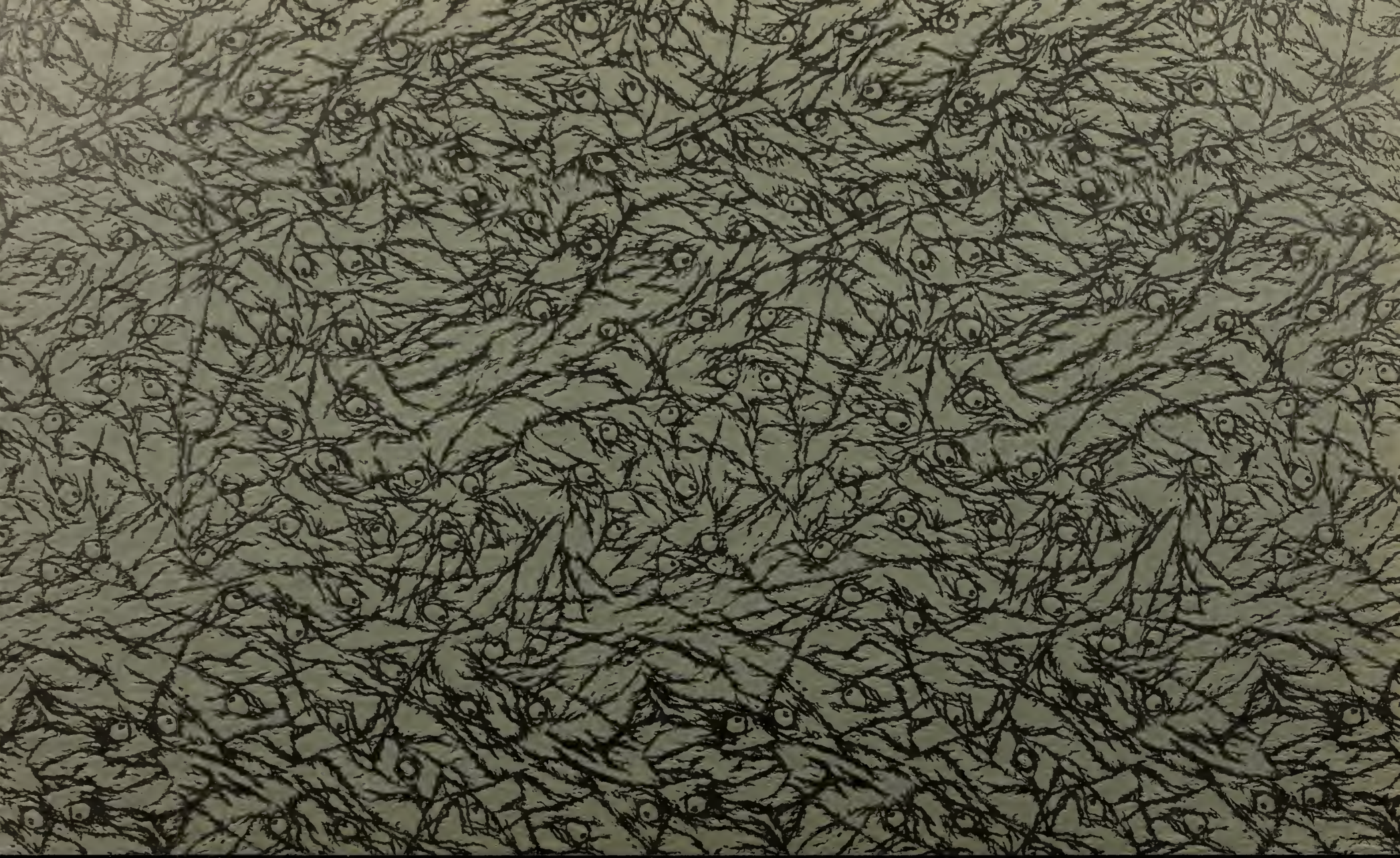
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